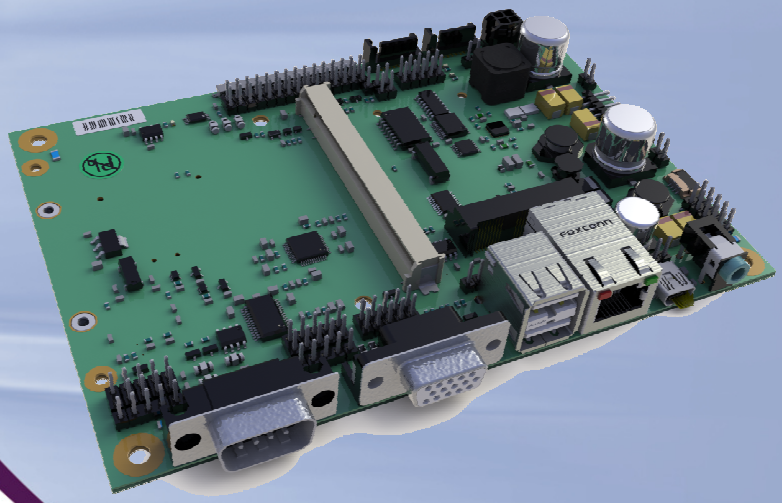
User's Manual



MSC Q7-MB-EP3

MSC Qseven™ Baseboard

REV 1.2

May 06th, 2011

Preface

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1 General Information

1.1 *Revision History*

Rev.	Date	Description
1.0	17.08.2010	Preliminary Release for website.
1.1	17.01.2011	JTAG Table correction.
1.2	06.05.2011	Part number added for Power X1101 connector. X604 USB added.

1.2 *Reference Documents*

[1] Qseven™ Module Specification
Revision 1.1
http://www.Qseven-standard.org/

[2] PCI Local Bus Specification Rev. 2.1
PCI21.PDF
Last update: June 1st, 1995
http://www.pcisig.com

[3] JILI Specification
Jilim120.pdf
Last update: April 7th, 2003
http://www.jumptec.de/product/data/jili/index.html

[4] Digital Video Interface DVI
dvi_10.pdf
Rev. 1.0 April 2nd, 1999
http://www.ddwg.org/

[5] Serial ATA Specification
Serial ATA 1.0 gold.pdf
Last update: August 29th, 2002 Rev.1.0
http://www.sata-io.org/

[6] IEEE Std. 802.3-2002
802.3-2002.pdf
http://www.ieee.org

[7] Universal Bus Specification
usb_20.pdf
Last update: April 27th, 2000
http://www.usb.org

[8] SDIO Card Specification
Simplified_SDIO_Card_Spec.pdf
Last update: February 8th, 2007
http://www.sdcard.org

[9] PCIe Mini Card Specification
http://www.pcisig.com

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1.3 *Definitions and Abbreviations*

COM	Computer-On-Module
RTC	Real Time Clock
PCI	Peripheral Component Interconnect
SATA	Serial Advanced Technology Attachment
USB	Universal Serial Bus
LVDS	Low Voltage Differential Signaling
JILI	JUMPtec Intelligent LVDS Interface
LAN	Local Area Network
VGA	Video Graphics Array
LPC	Low Pin Count
POST	Power on self test
SMBus	System Management Bus
MDI	Medium Dependent Interface

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2 Introduction

2.1 *Qseven™ Product Description*

Qseven™ modules are off the shelf compact, highly integrated Computer on Module devices which are designed to connect to a carrier baseboard. The Qseven™ standard is supported by multiple companies and defines a standardized square board size of 70x70 mm with s defined interface to the carrier board. The connection to the carrier board is made with an MXM type edge connector.

Typically a Qseven™ module includes CPU, chipset, memory, Ethernet controller, BIOS flash, SATA and USB controller. Interface controllers or connectors (e.g. RJ45) are implemented on the baseboard on to which the Qseven™ module is mounted.

In addition to the power supply also signals for PCIe, SATA, USB, LPC etc. are routed over the Qseven™ edge connector.

Thanks to the standardized mechanics and interfaces the system can be scaled to the performance requirements of the application. Despite the modular concept the system design is very flat and compact.

Qseven™ modules require a baseboard for proper operation.

This manual describes the Qseven™ Embedded Platform (MSC Q7-MB-EP3), which is a baseboard designed for small production runs or as a small evaluation platform for Qseven™ modules.

2.2 *Features*

- VGA display interface
- LVDS LCD panel interface, using the standard JILI30 connector
- 5 Pin LCD panel Backlight Connector
- High Definition Audio using Via VT1708A
  - Line Out
  - HDA Front Panel
- 2 SATA channel connectors, each capable of 300MB/s
- 6 Port USB interface
  - 2 USB type A connectors
  - 1 mini USB connector, which can be configured as host or client
  - 3 USB interfaces on on-board pin header connector
- 10/100/1000 Base-T LAN interface
- RS232 Com Port (using LPC SuperIO W83627HF)
- PCIe Mini Card slot
- SD card Socket
- SPI connector
- CAN connector
- JTAG connector
- Power supply with variable Input Supply Voltage from 10 to 28 V
- Beeper connector(optional)
- Resistive Touch controller
  - Two 4-wire Connectors
  - One 5-wire Connect
- Battery / goldcap option for RTC (Real Time Clock).

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2.3 Block Diagram

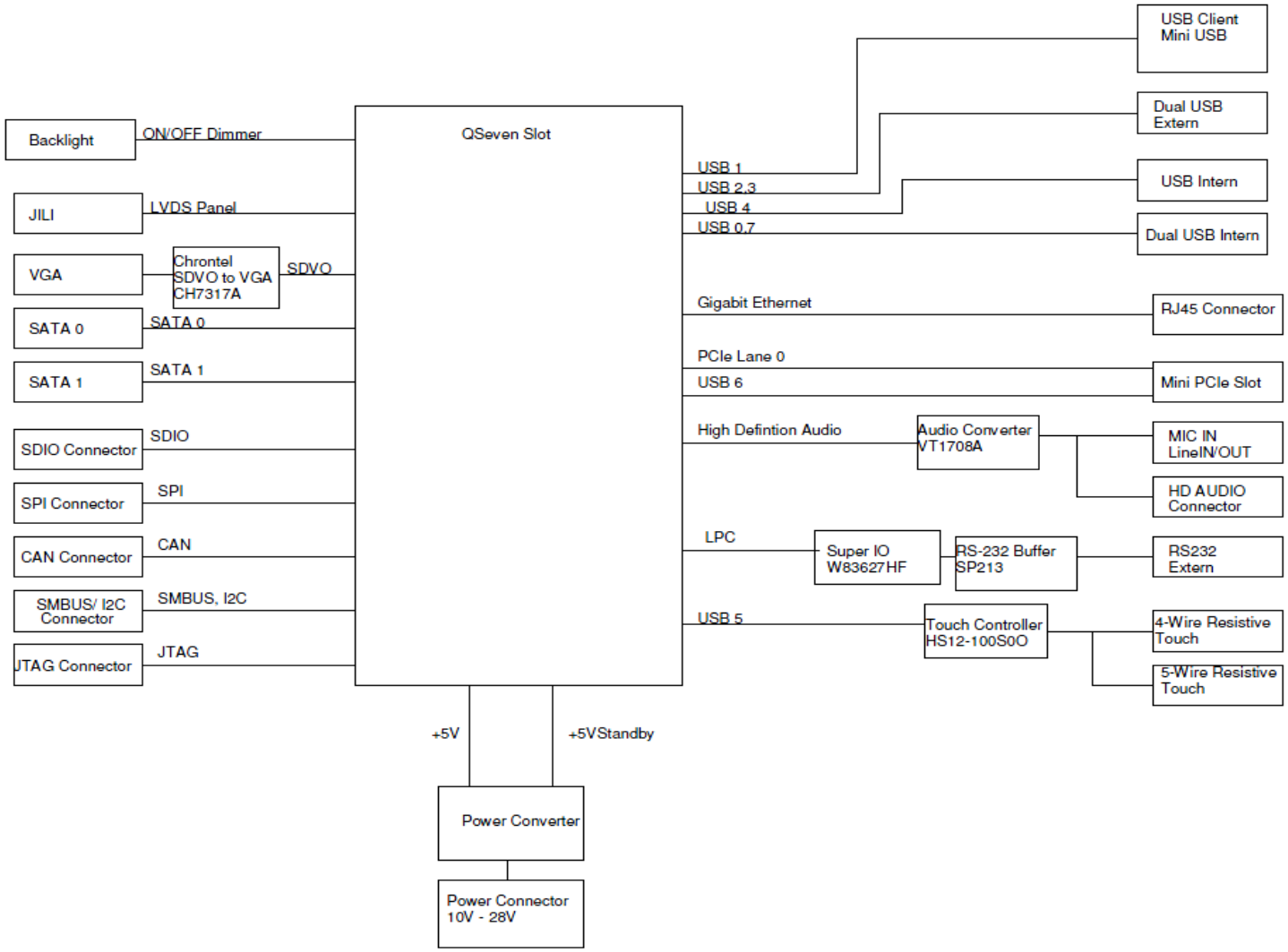

Figure 1 Block Diagram Q7-MB-EP3 baseboard

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2.4 Positioning of Connectors and Jumpers

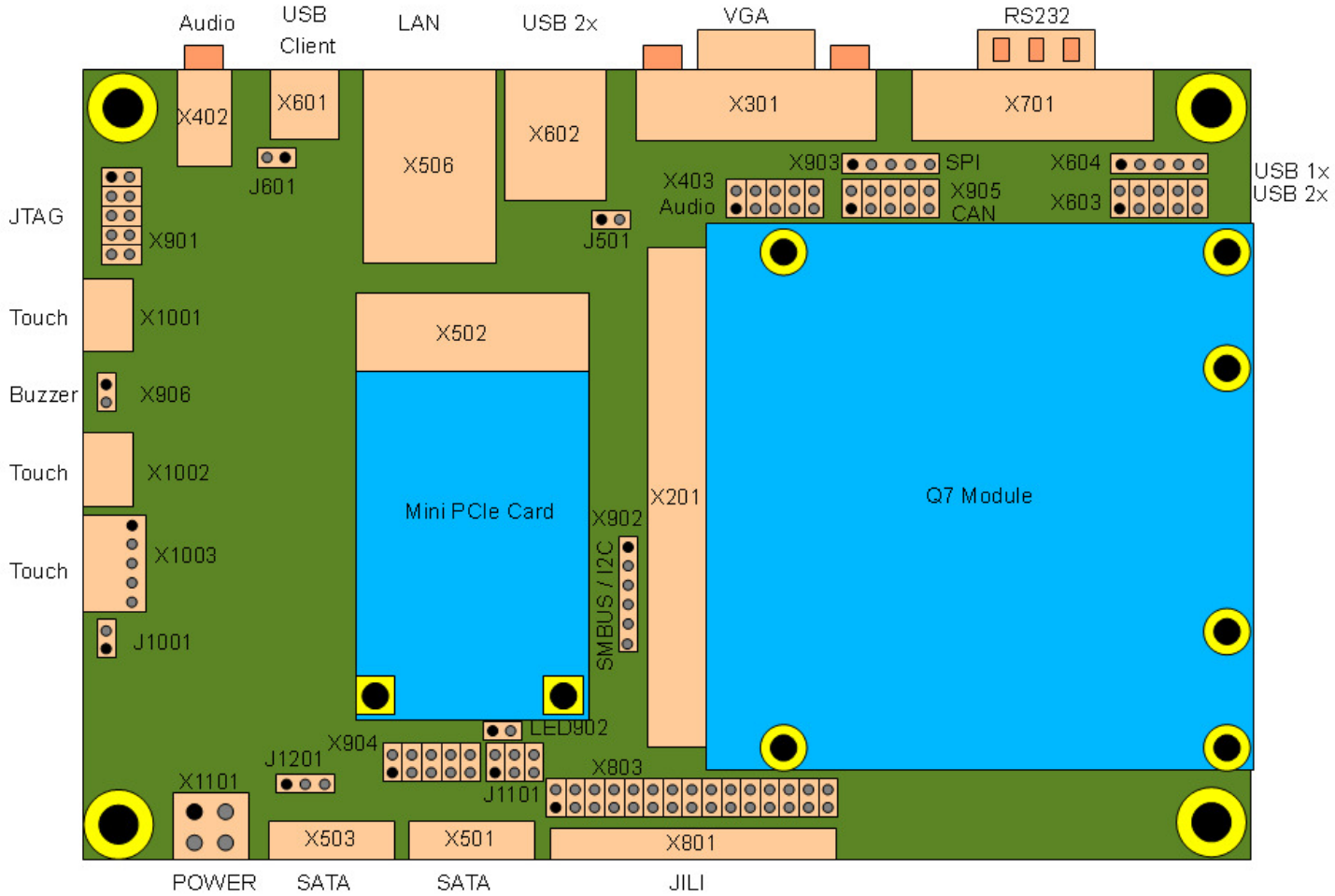

Figure 2 Positioning of Connectors and Jumpers (Top view)

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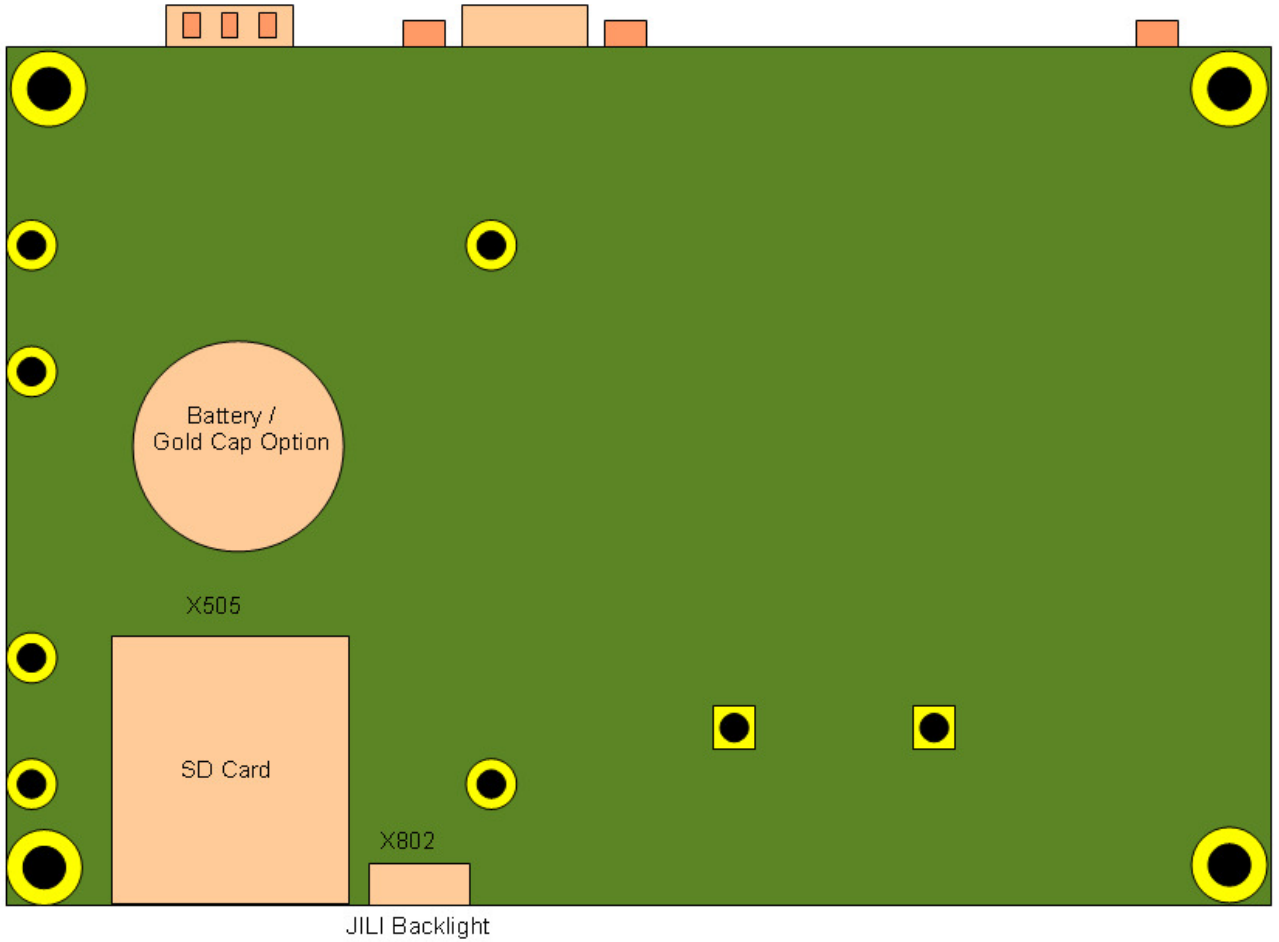

Figure 3 Positioning of Connectors (Bottom view)

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2.5 Dimensions

Dimension:	148.02 mm x 102.22 mm
Board Thickness:	1.8 mm + /-10%
Drill hole positioning tolerance:	+/- 0.1mm in X and Y
Drill hole diameter tolerance:	+ 0.1 mm
Max height of component on Top side:	16.8mm
Max height of component on Bottom side:	5.4mm

Figure 4 MSC Q7 MB EP3 Board Dimension

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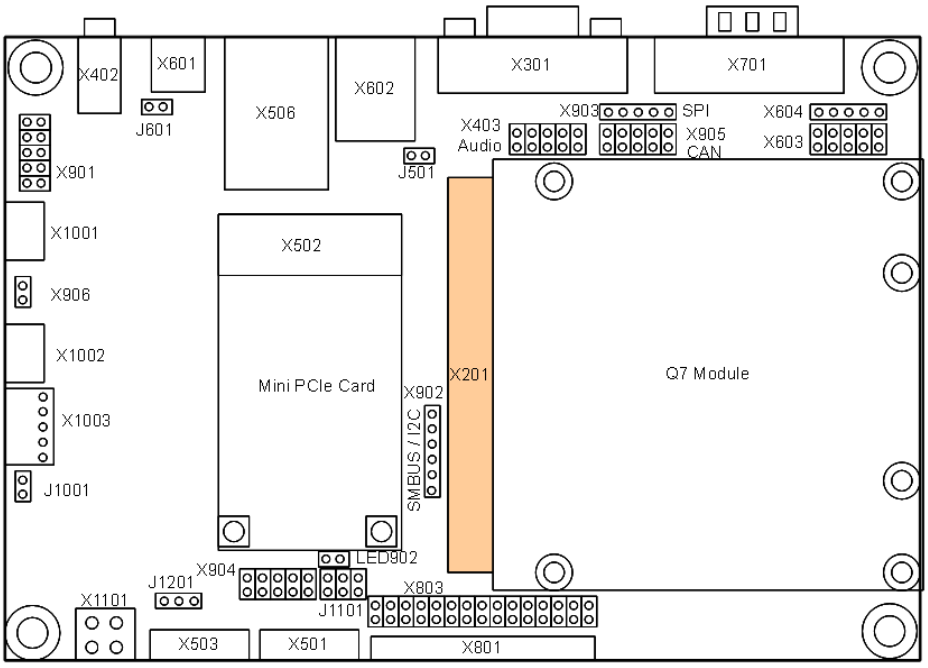
3 Hardware

NOTE: Not all Qseven™ modules may support all connectors and functionality available on the MSC Q7-MB-EP3 embedded platform baseboard.

3.1 *Qseven™ Connector (X201)*



Specification:

- Reference : X201 Foxconn AS0B326-S78N-7F
- Mating : PCB Q7 Module
- Pinout : Refer to Qseven™ specification [1]

Table 1 Pinout Qseven™ Connector X201

Row A		Row B	
1	GND	2	GND
3	GBE_MDI3-	4	GBE_MDI2-
5	GBE_MDI3+	6	GBE_MDI2+
7	GBE_LINK100#	8	GBE_LINK1000#
9	GBE_MDI1-	10	GBE_MDI0-
11	GBE_MDI1+	12	GBE_MDI0+
13	GBE_LINK#	14	GBE_ACT#
15	GBE_CTREF	16	SUS_S5#
17	WAKE#	18	SUS_S3#
19	SUS_STAT#	20	PWRBTN#
21	SLP_BTN#	22	LID_BTN#
23	GND	24	GND
KEY		KEY	
25	GND	26	PWGIN
27	BATLOW#	28	RSTBTN#
29	SATA0_TX+	30	SATA1_TX+
31	SATA0_TX-	32	SATA1_TX-
33	SATA_ACT#	34	GND

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35	SATA0_RX+	36	SATA1_RX+
37	SATA0_RX-	38	SATA1_RX-
39	GND	40	GND
41	BIOS_DISABLE#	42	SDIO_CLK#
43	SDIO_CD#	44	SDIO_LED
45	SDIO_CMD	46	SDIO_WP
47	SDIO_PWR#	48	SDIO_DAT1
49	SDIO_DAT0	50	SDIO_DAT3
51	SDIO_DAT2	52	SDIO_DAT5
53	SDIO_DAT4	54	SDIO_DAT7
55	SDIO_DAT6	56	SDIO_PWRSEL
57	GND	58	GND
59	HDA_SYNC	60	SMB_CLK
61	HDA_RST#	62	SMB_DAT
63	HDA_BITCLK	64	SMB_ALERT#
65	HDA_SDI	66	I2C_CLK
67	HDA_SDO	68	I2C_DAT
69	THRM#	70	WDTRIG#
71	THRMTRIP#	72	WDOUT
73	GND	74	GND
75	USB_P7-	76	USB_P6-
77	USB_P7+	78	USB_P6+
79	USB_6_7_OC#	80	USB_4_5_OC#
81	USB_P5-	82	USB_P4-
83	USB_P5+	84	USB_P4+
85	USB_2_3_OC#	86	USB_0_1_OC#
87	USB_P3-	88	USB_P2-
89	USB_P3+	90	USB_P2+
91	USB_CC	92	RSVD
93	USB_P1-	94	USB_P0-
95	USB_P1+	96	USB_P0+
97	GND	98	GND
99	LVDS_A0+	100	LVDS_B0+
101	LVDS_A0-	102	LVDS_B0-
103	LVDS_A1+	104	LVDS_B1+
105	LVDS_A1-	106	LVDS_B1-
107	LVDS_A2+	108	LVDS_B2+
109	LVDS_A2-	110	LVDS_B2-
111	LVDS_PPEN	112	LVDS_BLEN
113	LVDS_A3+	114	LVDS_B3+
115	LVDS_A3-	116	LVDS_B3-
117	GND	118	GND
119	LVDS_A_CLK+	120	LVDS_B_CLK+
121	LVDS_A_CLK-	122	LVDS_B_CLK-
123	LVDS_BLT_CTRL	124	RSVD
125	LVDS_DID_DAT	126	LVDS_BLC_DAT
127	LVDS_DID_CLK	128	LVDS_BLC_CLK
129	CAN0_TX	130	CAN0_RX
131	SDVO_BCLK+	132	SDVO_INT+
133	SDVO_BCLK-	134	SDVO_INT-
135	GND	136	GND
137	SDVO_GREEN+	138	SDVO_FLDSTALL+
139	SDVO_GREEN-	140	SDVO_FLDSTALL-
141	GND	142	GND
143	SDVO_BLUE+	144	SDVO_TVCLKIN+
145	SDVO_BLUE-	146	SDVO_TVCLKIN-
147	GND	148	GND
149	SDVO_RED+	150	SDVO_CTRL_DAT
151	SDVO_RED-	152	SDVO_CTRL_CLK
153	HDMI_HPD#	154	DP_HPD#

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155	PCIE_CLK_REF+	156	PCIE_WAKE#
157	PCIE_CLK_REF-	158	PCIE_RST#
159	GND	160	GND
161	PCIE3_TX+	162	PCIE3_RX+
163	PCIE3_TX-	164	PCIE3_RX-
165	GND	166	GND
167	PCIE2_TX+	168	PCIE2_RX+
169	PCIE2_TX-	170	PCIE2_RX-
171	EXCD0_PERST#	172	EXCD1_PERST#
173	PCIE1_TX+	174	PCIE1_RX+
175	PCIE1_TX-	176	PCIE1_RX-
177	EXCD0_CPPE#	178	EXCD1_CPPE#
179	PCIE0_TX+	180	PCIE0_RX+
181	PCIE0_TX-	182	PCIE0_RX-
183	GND	184	GND
185	LPC_AD0	186	LPC_AD1
187	LPC_AD2	188	LPC_AD3
189	LPC_CLK	190	LPC_FRAME#
191	SERIRQ	192	LPC_LDRQ#
193	VCC_RTC	194	SPKR
195	FAN_TACHOIN	196	FAN_PWMOUT
197	GND	198	GND
199	SPI_MOSI	200	SPI_CS0
201	SPI_MISO	202	SPI_CS1
203	SPI_SCK	204	RSVD
205	VCC_5V_SB	206	VCC_5V_SB
207	MFG_NC0	208	MFG_NC2
209	MFG_NC1	210	MFG_NC3
211	VCC	212	VCC
213	VCC	214	VCC
215	VCC	216	VCC
217	VCC	218	VCC
219	VCC	220	VCC
221	VCC	222	VCC
223	VCC	224	VCC
225	VCC	226	VCC
227	VCC	228	VCC
229	VCC	230	VCC

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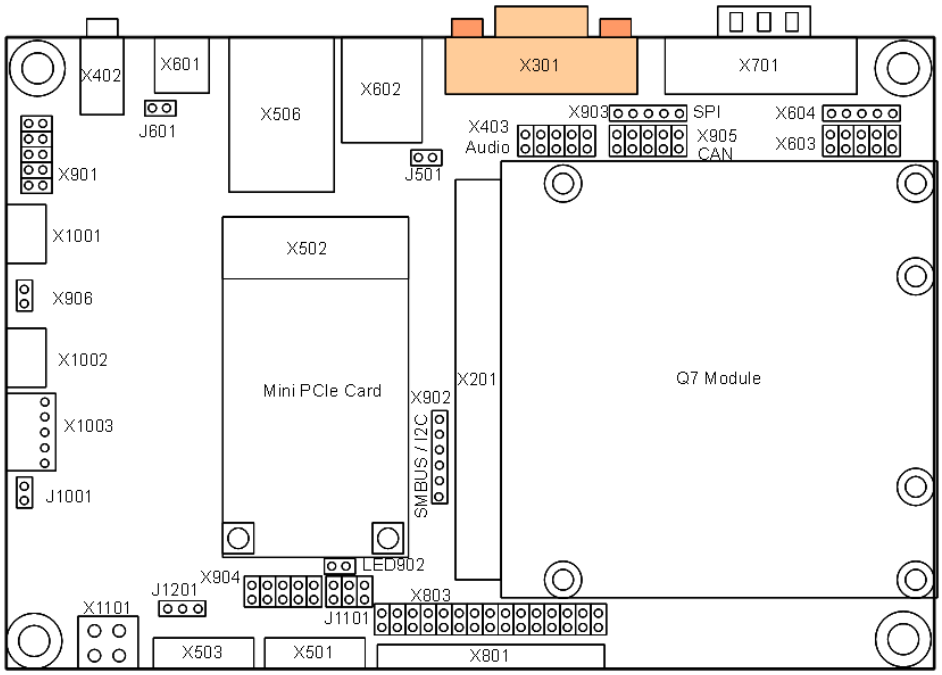
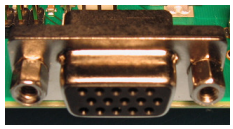
3.2 VGA Interface (X301)





The VGA signals are generated via a Chrontel CH7317B SDVO to VGA display controller.

Specification:

- References : X301 SUYIN 070207FR015S218ZA
- Mating : VGA-Monitor

Table 2 Pinout VGA Connector X301

Pin	Signal name	Function
1	RED	Signal red
2	GREEN	Signal green
3	BLUE	Signal blue
4	RSVD	reserved
5	GND	Ground digital
6	RGND	Ground red
7	GGND	Ground green
8	BGND	Ground blue
9	+5V	+5V VDC
10	SGND	Sync. Ground
11	ID0	Monitor ID Bit 0 (optional)
12	SDA	DDC Data
13	HSYNC	Horizontal Sync.
14	VSYNC	Vertical Sync.
15	SCL	DDC Clock

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3.3 LCD Panel LVDS Interface

3.3.1 JILI30 Connector

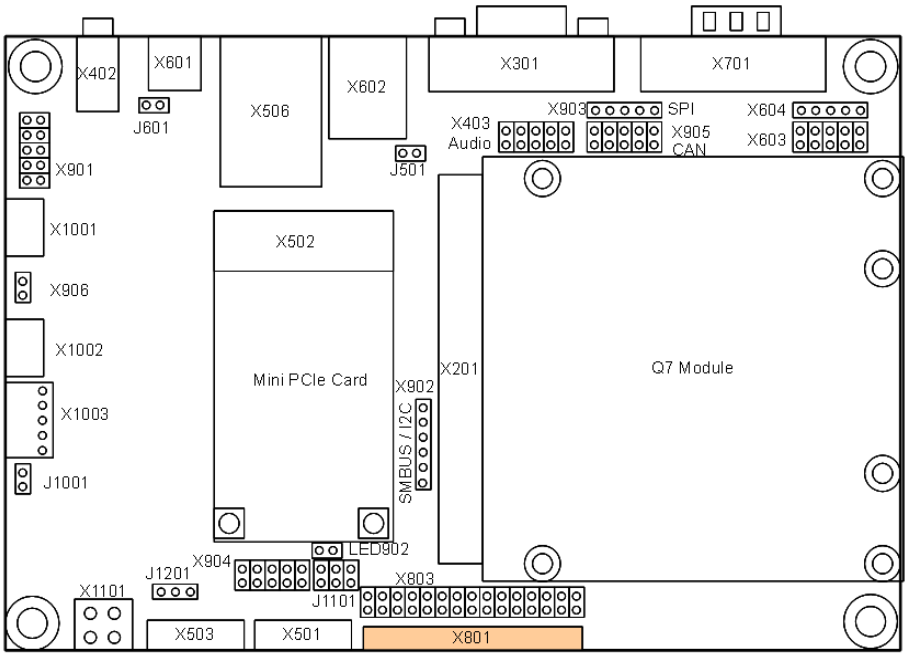
LCD/TFT displays with LVDS inputs can be connected via the JILI30 connector.

Two 24 bit LVDS channels are available on this 32-pin header. Single channel and 18bit displays are also supported using the appropriate cables.

Note: Support of single/dual channel and 18/24 bit will depend on the Qseven™ module used.

The Supply voltage of the LVDS Signal can be adjusted with a jumper on the X803 header.

Please contact support.boards@msc-ge.com for assistance in finding appropriate display/backlight inverter and cable sets for your application requirements



PIN1

Specification:

- References : X801 Hirose MDF76GW-30S-1H(55)
- Mating : Cable Plug MDF76-30P-1C

Table 3 Pinout JILI30 Connector X801

Pin	Signal name	Function
1	LVDS_A0-	LVDS Negative data signal (-)
2	LVDS_A0+	LVDS Positive data signal (+)
3	LVDS_A1-	LVDS Negative data signal (-)
4	LVDS_A1+	LVDS Positive data signal (+)
5	LVDS_A2-	LVDS Negative data signal (-)
6	LVDS_A2+	LVDS Positive data signal (+)
7	GND	Ground
8	LVDS_A_CLK-	LVDS Negative clock signal (-)
9	LVDS_A_CLK+	LVDS Positive clock signal (+)
10	LVDS_A3-	LVDS Negative data signal (-)
11	LVDS_A3+	LVDS Positive data signal (+)

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12	LVDS_B0-	LVDS Negative data signal (-)
13	LVDS_B0+	LVDS Positive data signal (+)
14	GND	Ground
15	LVDS_B1-	LVDS Negative data signal (-)
16	LVDS_B1+	LVDS Positive data signal (+)
17	GND	Ground
18	LVDS_B2-	LVDS Negative data signal (-)
19	LVDS_B2+	LVDS Positive data signal (+)
20	LVDS_B_CLK-	LVDS Negative clock signal (-)
21	LVDS_B_CLK+	LVDS Positive clock signal (+)
22	LVDS_B3-	LVDS Negative data signal (-)
23	LVDS_B3+	LVDS Positive data signal (+)
24	GND	Ground
25	PANEL_I2C_DAT	I2C Signal
26	LVDS_PPEN	Panel Power Enable
27	PANEL_I2C_CLK	I2C Signal
28	VCC	Power Supply: +3.3V or +5V or +12V
29	VCC	Power Supply: +3.3V or +5V or +12V
30	VCC	Power Supply: +3.3V or +5V or +12V

3.3.2 Backlight Inverter Interface (X802)

The backlight inverter (for CCFL) or LED driver (for CCD) is attached using this 5 pin connector.

The supply voltage (VCC) of the backlight can be selected with a jumper on X803 for 12V, 5V or 3.3V.

The inverter or LED driver can be turned on or off using the BLON signal. The polarity of the BLON signal is selected with a jumper on X803.

The brightness of the backlight is controlled via the VCON signal.

The LVDS_BKLT_CTRL signal coming from the Qseven™ module usually provides a PWM signal. Depending on the settings of jumpers on X803 the following brightness control signals can be applied:

- PWM signal either inverted or non-inverted
- The analog signal level is derived either from the inverted or from the non-inverted PWM signal. (The PWM signal is integrated and then limited to the selected peak voltage of the backlight inverter).

The peak level of the brightness signal can be selected with a jumper on X803 to be either 3.3V or 5V.

The maximum brightness (with 0V or with 3.3V/5V) will depend on the Inverter or LED backlight type used.

See section 3.3.4 for LVDS Panel Jumper settings.

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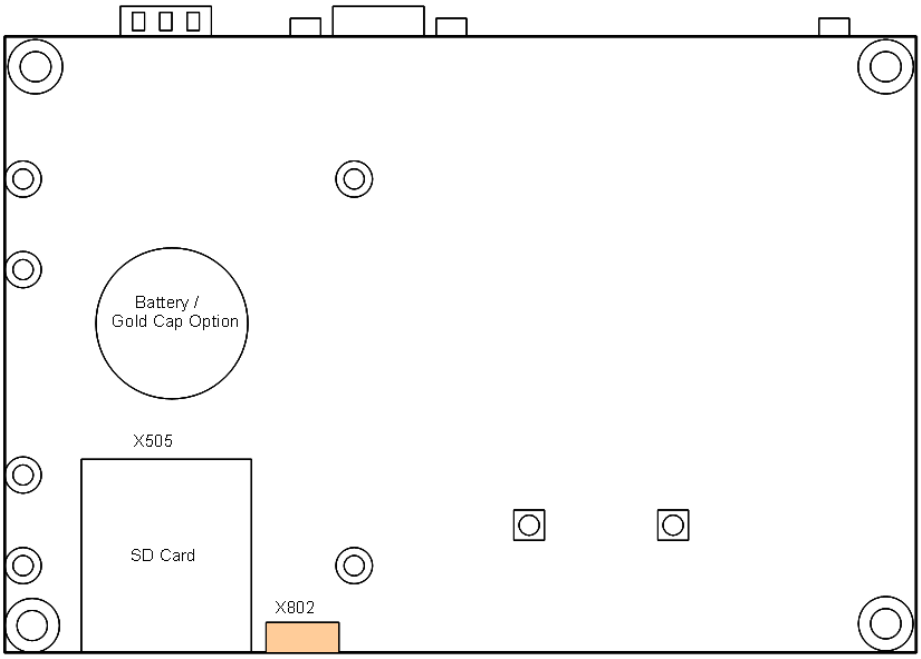

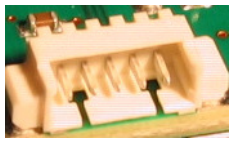

Specification:

- References : X802 Würth Elektronik 653105131822
- Mating : Cable Plug 653005113322

Table 4 Pinout Backlight Connector X802

Pin	Signal name	Function
1	VCC	Backlight power supply
2	GND	Ground
3	BLON	Backlight On/Off control
4	VCON	Brightness control
5	GND	Ground

3.3.3 LVDS EEPROM

To store configuration data for the display, a serial EEPROM is connected to the LVDS I2C bus -signals LVDS_I2C_CK and LVDS_I2C_DAT.

To avoid conflicts with a configuration EEPROM on the connected display, this EEPROM can be mapped to an unused address space. The address can be configured with a jumper on X803.

See section 3.3.4 for Jumper settings.

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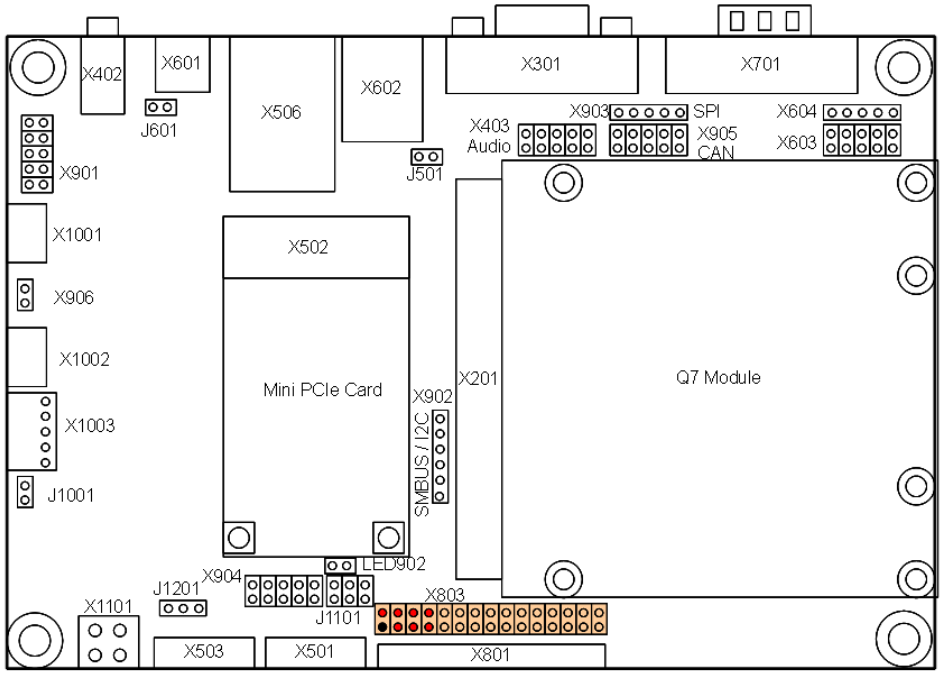
3.3.4 LVDS Panel Jumper settings

3.3.4.1 Display power Jumper

The power supply voltage for the LCD panel (NOT the backlight) is selected with a jumper on the jumper block X803. The software control of the LCD panel enable signal can be bypassed by inserting a jumper on pins 1-2.



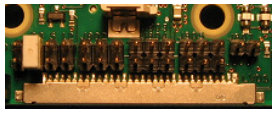


Table 5 Jumper settings LCD Panel Power X803

Function	X803 Pins
Power always on*	1-2
+3.3 V	3-4 (default)
+5.0 V	5-6
+12V	7-8

*Panel is no longer enabled by LVDS_VDD_EN# signal, but is permanently enabled if this jumper is installed.

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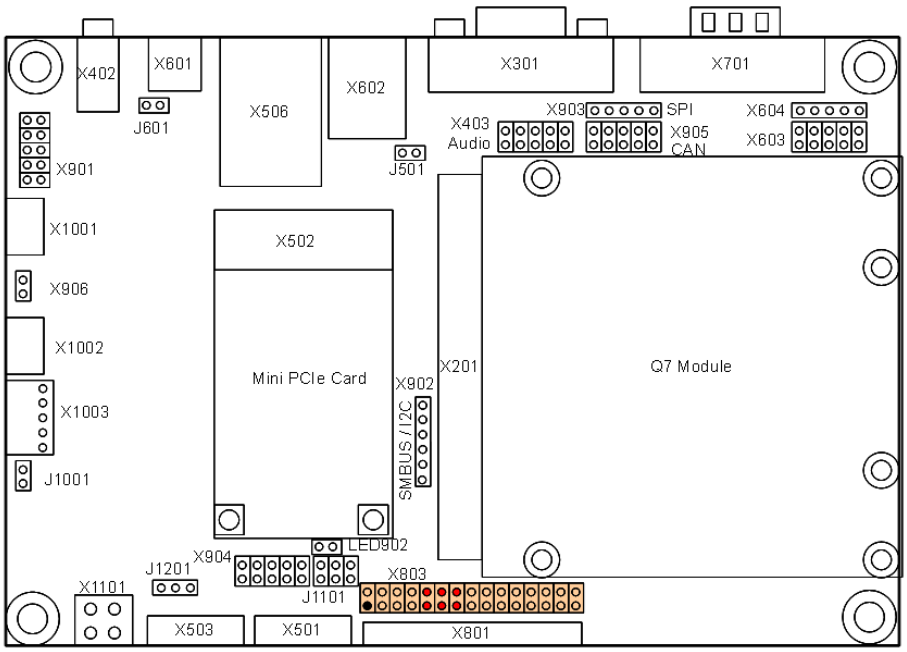
3.3.4.2 Backlight power selection jumper

The backlight power for the inverter or LED driver is selected using jumpers on X803.



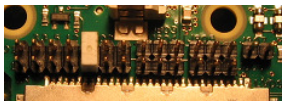


Table 6 Jumper settings Backlight power X803

Backlight Voltage	X803 Pins
+3.3 V / 1A	9-10 (default)
+5.0 V / 1A	11-12
+12.0 V / 1A	13-14

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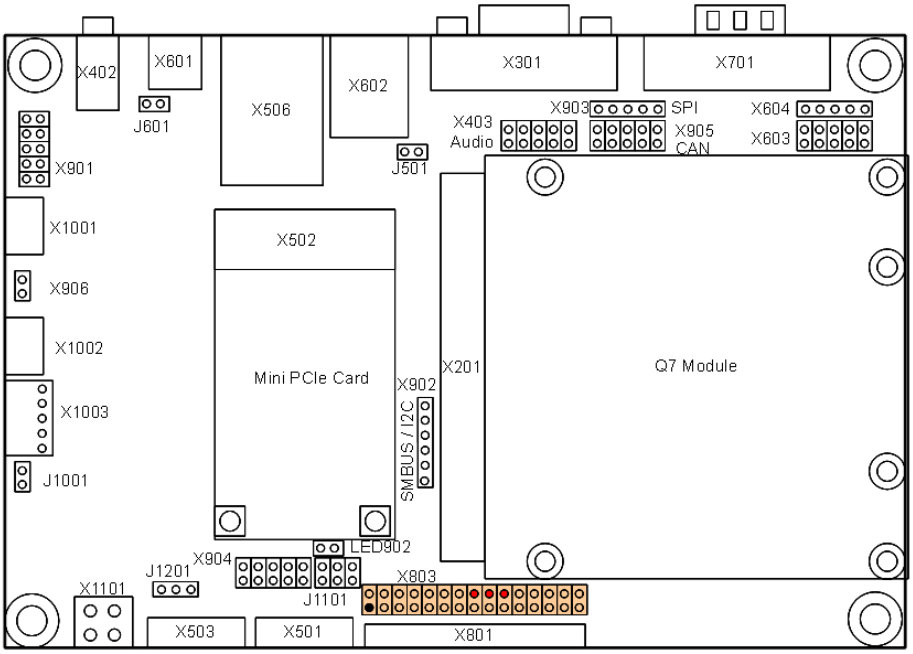
3.3.4.3 Backlight Enable polarity selection jumper

The polarity of the backlight enable signal (BLON) can be selected using jumpers on X803.



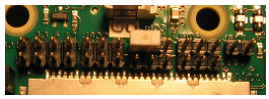


Table 7 Jumper settings Backlight Enable Polarity X803

Function	X803 Pins
BLON# (low active)	16-18 (default)
BLON (high active)	18-20

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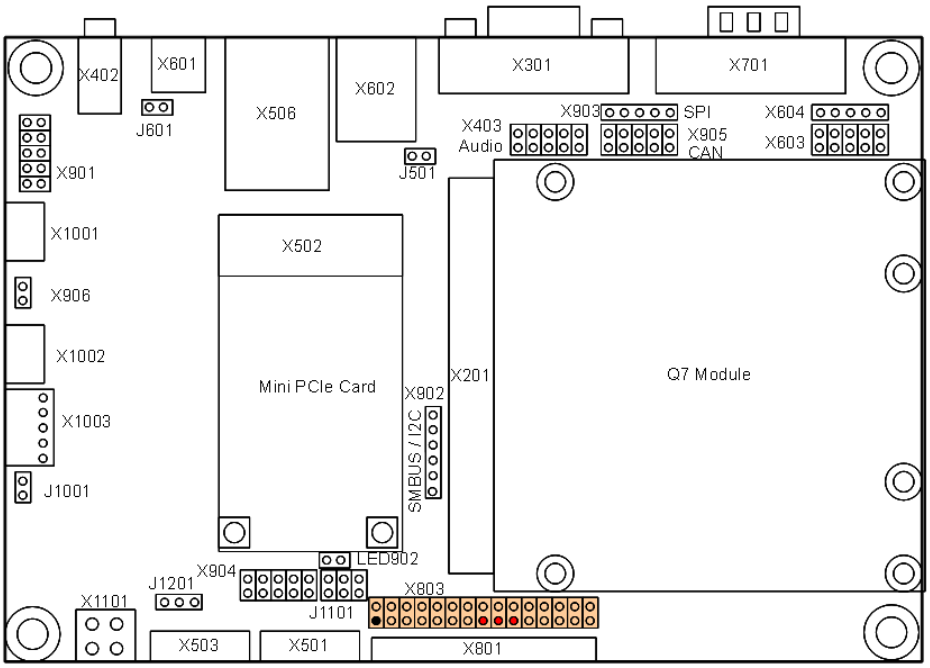
3.3.4.4 Backlight brightness peak voltage level jumper

This jumper selects the voltage range for the signal level used for the brightness control. This signal can be either a PWM signal or an analog voltage level depending on the settings of jumpers on X803. The voltage range can be either 3.3V or 5V



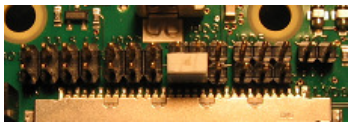


Table 8 Jumper settings Backlight Brightness Voltage X803

Function	X803 Pins
3.3V Peak level	15-17 (default)
5V Peak level	17-19

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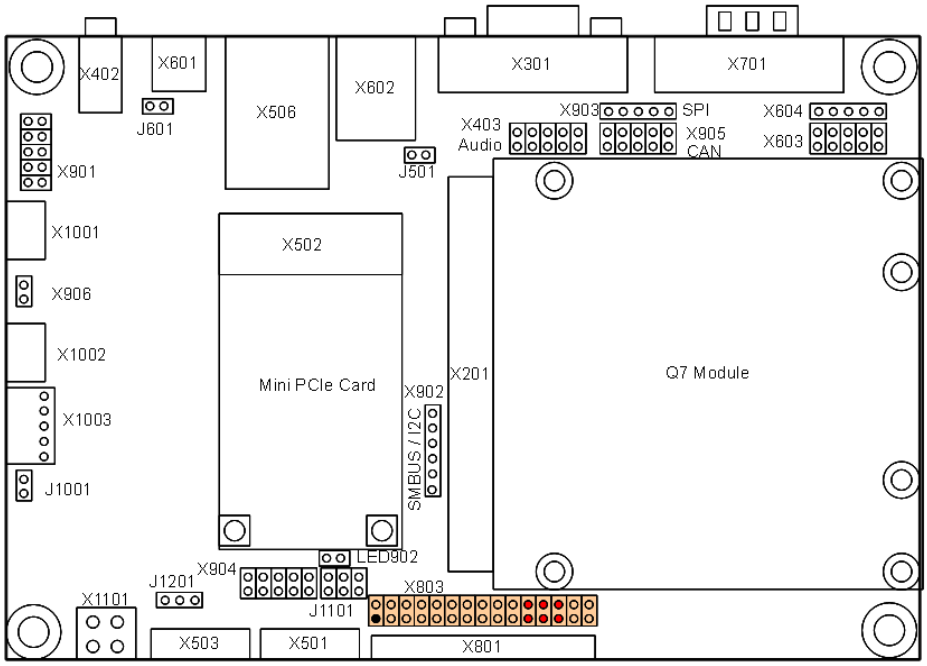
3.3.4.5 Backlight brightness control jumpers

The jumpers on X803 are used in combination to select the type of brightness control signal used for the LCD panel backlight inverter or LED driver. The signal coming from the Qseven™ module is typically a PWM signal. This signal can be passed through unmodified, or inverted. It can also be converted to an analog voltage level for backlights which do not use a PWM signal for brightness control.



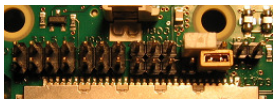


Table 9 Jumper settings Backlight Brightness Control X803

X803	X803	Output signal
22-24	21-23	Analog level based on inverted PWM signal
22-24	23-25	PWM signal (non-inverted) (default)
24-26	21-23	Analog level based on non-inverted PWM signal
24-26	23-25	PWM signal (inverted)

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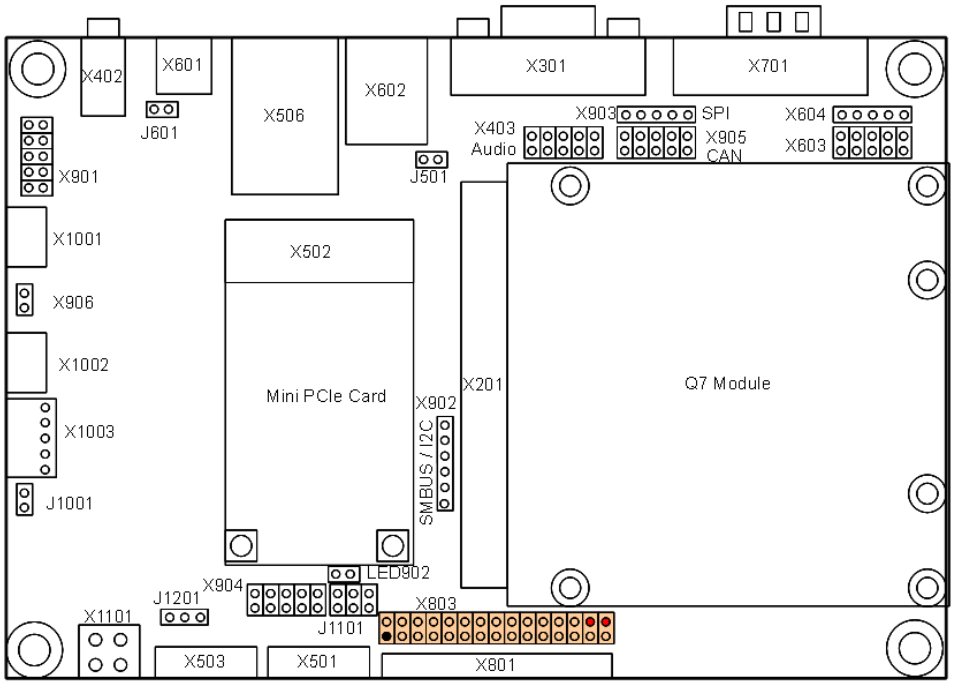
3.3.4.6 EDID EEPROM address select jumper

An EDID EEPROM is available on the baseboard in order to configure a customized setting for an LCD panel which is not available in the default BIOS LCD panel entries.



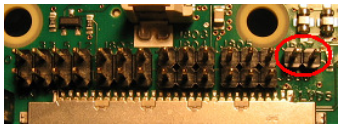


Table 10 Jumper settings EDID EEPROM Address X803

Function	X803 pins
EDID EEPROM disabled	28-30 Removed (default)
EDID EEPROM enabled	28-30 Installed

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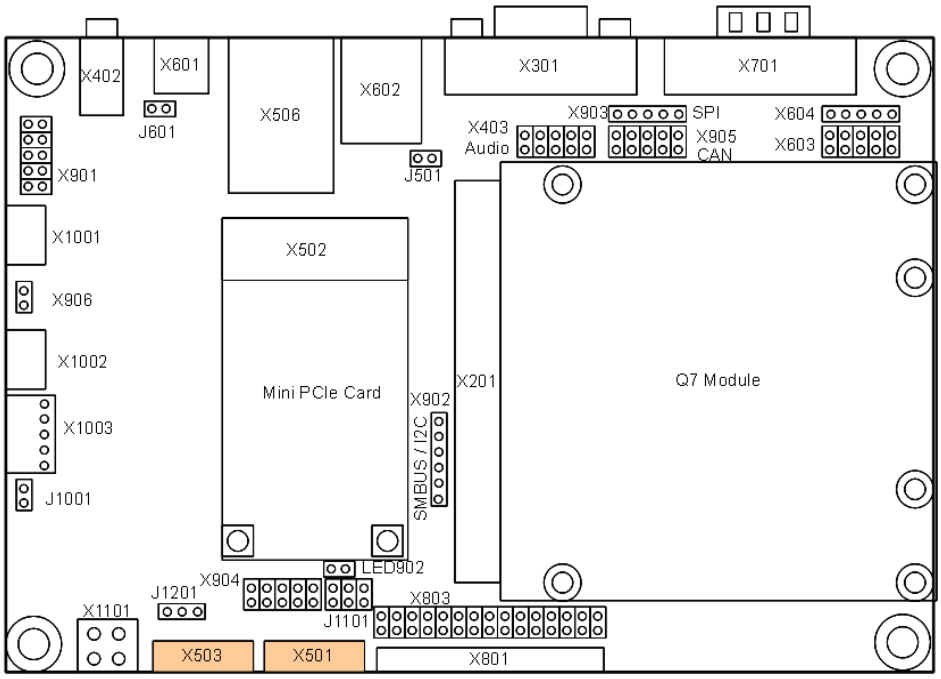
3.4 SATA-Interface (X501, X503)

For the connection of SATA drives there are two SATA interfaces



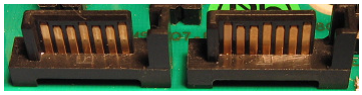


Table 11 Assignment SATA Channel to Connector

SATA Channel	References
SATA 0	X501
SATA 1	X503

Specification:

- References : X501, X503 FCI 59334-002-LF
- Mating : SATA-cable
- Pinout : Refer to SATA Specification [8, page 46, table 3]

Table 12 Pinout SATA

Con	Signal name	Function
1	GND	Ground
2	TX+	SATA Positive transmit signal (+)
3	TX-	SATA Negative transmit signal (-)
4	GND	Ground
5	RX-	SATA Negative transmit signal (-)
6	RX+	SATA Positive transmit signal (+)
7	GND	Ground

Note: Availability of the SATA Ports will depend on the Qseven™ module used.

3.4.1 SATA LED

An onboard LED (LED505) is provided to indicate activity on the SATA port.

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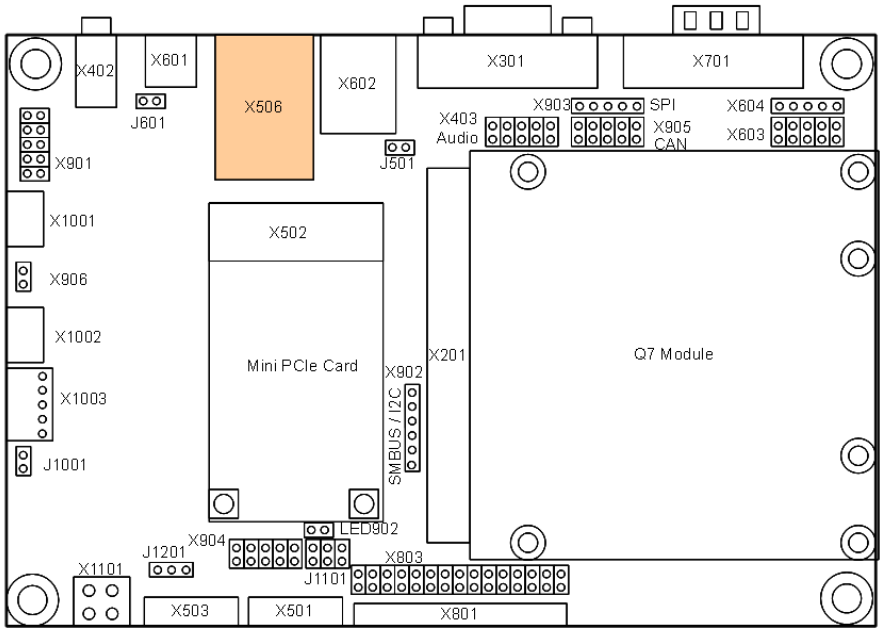
3.5 Ethernet (X506)



The MSC Q7-MB-EP3 can be connected to a local area network via a 10/100/1000 Base-T interface. A 1000Base-T transformer is assembled on the baseboard; hence the Qseven™ CPU module must support Gigabit Ethernet.

Specification:

- References : X506 Foxconn JMF3811E-2102-4F
- Pinout : Refer to IEEE Std. 802.3 [9, section three, page 225]

3.5.1 Wake on LAN

The system can be wake up from the sleep S3(Suspend to RAM) state by sending the magic packet over Ethernet.

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3.6 USB Topology

Eight USB ports are normally provided by the Qseven™ module.

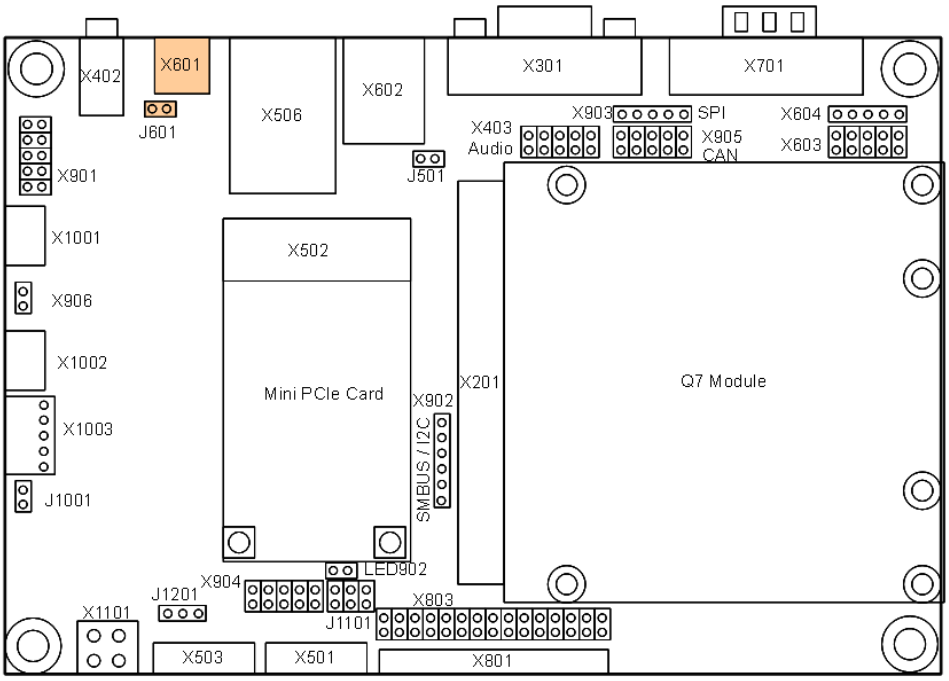
The assignment of the ports is defined in the following table:

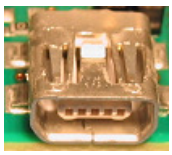
Table 13 Assignment USB Ports

Signal	Source	Target	Remark
USB[0]+ USB[0]-	Qseven™ connector USB0	X603	On-board 10 Pin Header
USB[1]+ USB[1]-	Qseven™ connector USB1	X601	Mini USB Client / Host
USB[2]+ USB[2]-	Qseven™ connector USB2	X602	Dual USB Connector
USB[3]+ USB[3]-	Qseven™ connector USB3	X602	Dual USB Connector
USB[4]+ USB[4]-	Qseven™ connector USB4	X604	On-board 5 Pin Header
USB[5]+ USB[5]-	Qseven™ connector USB5	X1001/X1002	Touch controller
USB[6]+ USB[6]-	Qseven™ connector USB6	X502	PCIe Mini Card
USB[7]+ USB[7]-	Qseven™ connector USB7	X603	On-board 10 Pin Header

Note : USB6 and USB7 for current Qseven™ modules support USB 2.0 only and will NOT work with USB 1.1 devices - e.g. Keyboard, Mouse, …

3.6.1 Mini USB Connector (X601)





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Specification:

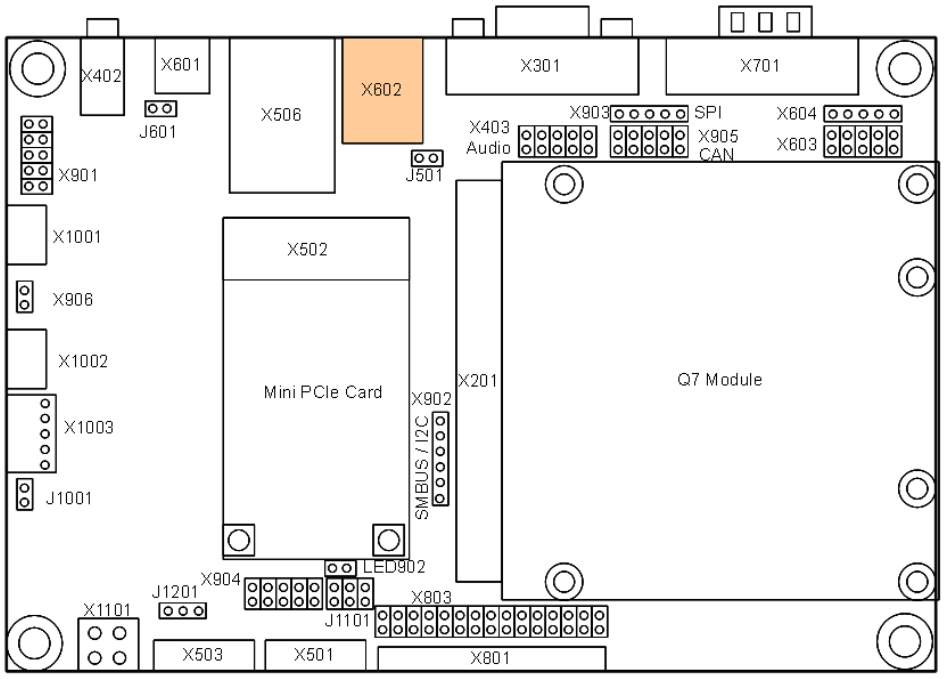
- References : X601 Molex 67803-8020
- Mating : Mini USB-cable
- Pinout : according to USB specification 2.0 [7]
-

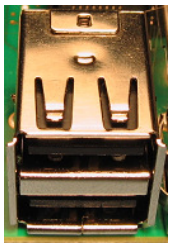
The Mini USB port can be configured as a client or host using jumper J601.

Table 14 Jumper option USB Client J601

Function	J601
USB mini AB client	removed
USB mini AB host	inserted (default)

3.6.2 Dual USB Connector (X602)





Specification:

- References : X602 Neltron 5075AR-08B-BK
- Mating : USB-A cable
- Pinout : according to USB specification 2.0 [7]

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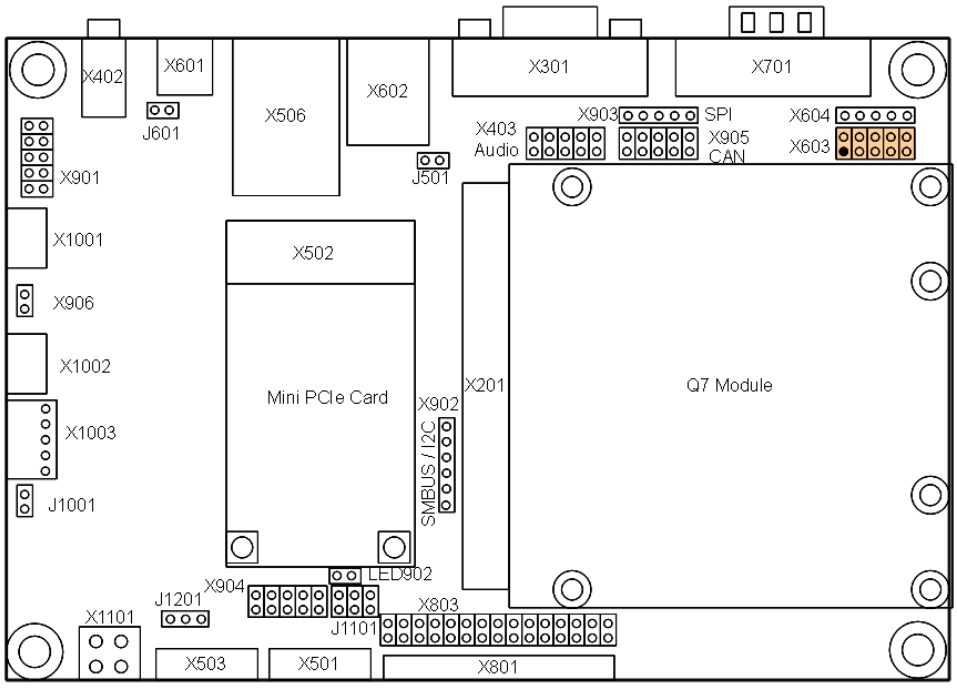
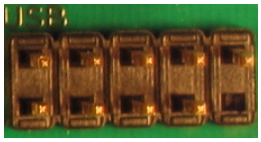
3.6.3 Internal Dual USB-Connector (X603)



Pin 2 Pin 10



Pin 1

Specification:

- References : X603 male connector 2x5pin pitch 2.54mm
- Mating : female crimp-connector Reference FCI 65043-032

Table 15 Pinout Dual USB Connector X603

Pin	Signal	Pin	Signal
1	USB_VCC0	2	USB_VCC7
3	USB_R0-	4	USB_R7-
5	USB_R0+	6	USB_R7+
7	GND	8	GND
9	No Pin	10	NC

USB7 for current Qseven™ modules supports USB 2.0 only and will NOT work with USB 1.1 devices - e.g. Keyboard, Mouse…

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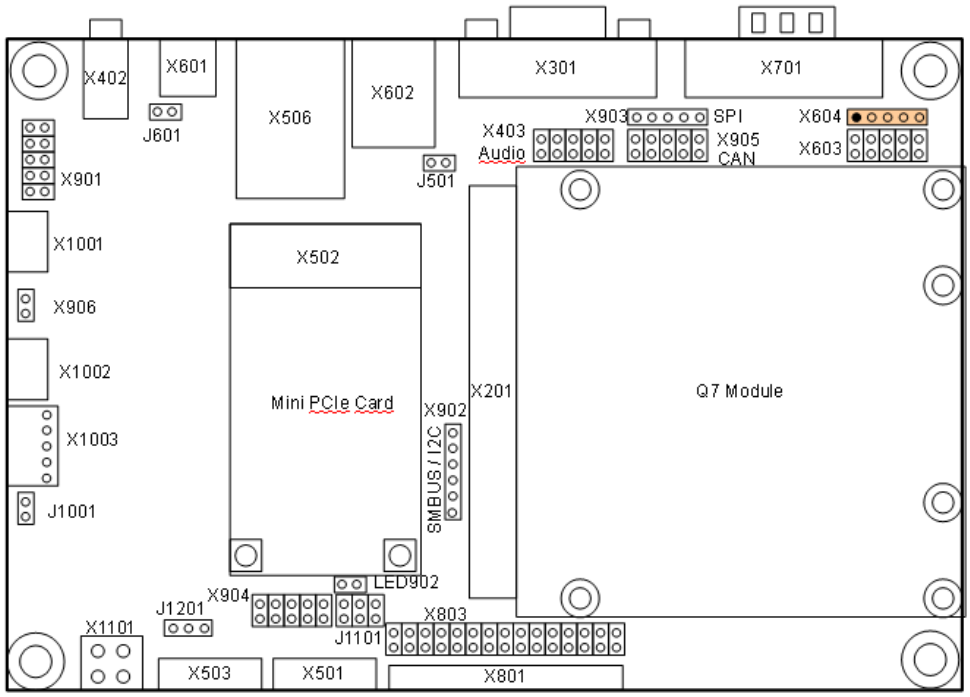
3.6.4 Internal single USB Connector (X604)



Specification:

- References : X604 CAB 1001-161-005-RoHS
- Mating : female crimp-connector Reference FCI 65039-032

Table 16 Pinout Internal USB Connector X604

Pin	Signal
1	USB_VCC4
2	USB_R4-
3	USB_R4+
4	GND
5	No Connect

3.6.5 USB Power Supply

The power supplies are protected by USB power switches. In addition to that the input voltages of the USB power switches are protected by resettable fuses.

The USB power switches have the following features:

- The output current is limited to 500mA per port
- A signal to detect overcurrent is generated for each pair of ports
  - USB0 and USB1 have one common signal to detect overcurrent
  - USB2 and USB3 have one common signal to detect overcurrent
  - USB4 and USB5 have one common signal to detect overcurrent
  - USB6 and USB7 have one common signal to detect overcurrent

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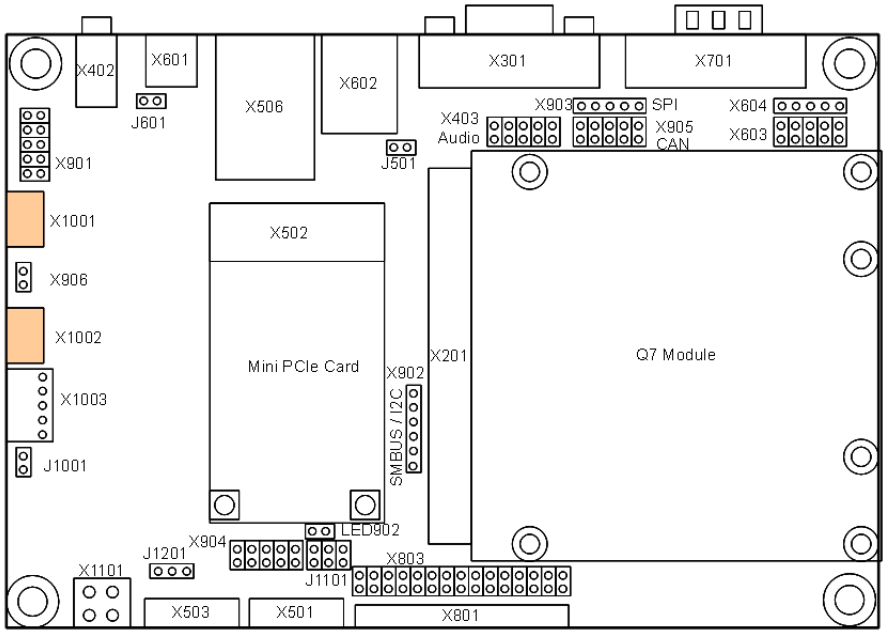
3.7 Touch Interface (X1001, X1002)

A Resistive Touch Controller for 4-Wire and 5-Wire touch screens is integrated on the base board The touch controller is the HS12-100S0O from Hampshire. The latest device drivers for the controller can be downloaded from www.msc-ge.com/support-boards

The X+, X- and Y+, Y- signals are connected to X1001, X1002 and X1003, so whichever connector is most convenient for the touch interface can be used.



Specification:

- References: X1001 (4-Wire eTurbo-Touch pinning) Hirose FH12-10-4-SA-1SH
  X1002 (4-Wire AUO-Touch pinning) Hirose FH12-10-4-SA-1SH
- Mating: X1001 & 1002 FPC/FCC pitch 0.5mm x 0.3mm
- Mating: X1003 female crimp-connector Reference FCI 65039-032

Table 17 Pinout 4 wire Touch X1001, X1002

X1001 4-Wire eTurbo-Touch		X1002 4-Wire AUO-Touch	
Pin	**Signal**	**Pin**	**Signal**
1	Y+	1	X+
2	X-	2	Y+
3	Y-	3	X-
4	X+	4	Y-

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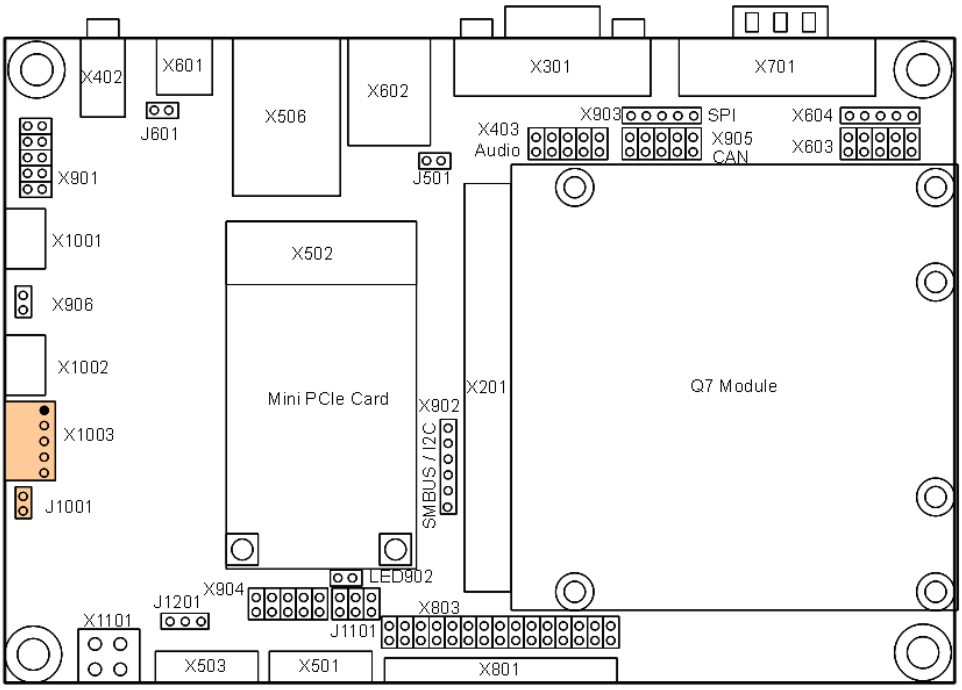

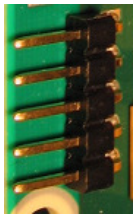

Specification:

- References: X1003 (5-Wire) CAB 1006-141-005
- Mating: X1003 female crimp-connector Reference FCI 65039-032

Table 18 Pinout 5 Wire Touch X1003

X1003 5-Wire Wire eTurbo-Touch	
Pin	**Signal**
1	Y+
2	X+
3	5W
4	X-
5	Y-

Please contact support.boards@msc-ge.com for assistance in finding appropriate displays with touch screen for your application requirements

3.7.1 Touch control jumper (J1001)

The touch controller interface can be switched between 4 and five-wire using this jumper.

Table 19 Jumper Touch Select J1001

Function	J1001
5-Wire enabled	removed
4-Wire enabled	installed (default)

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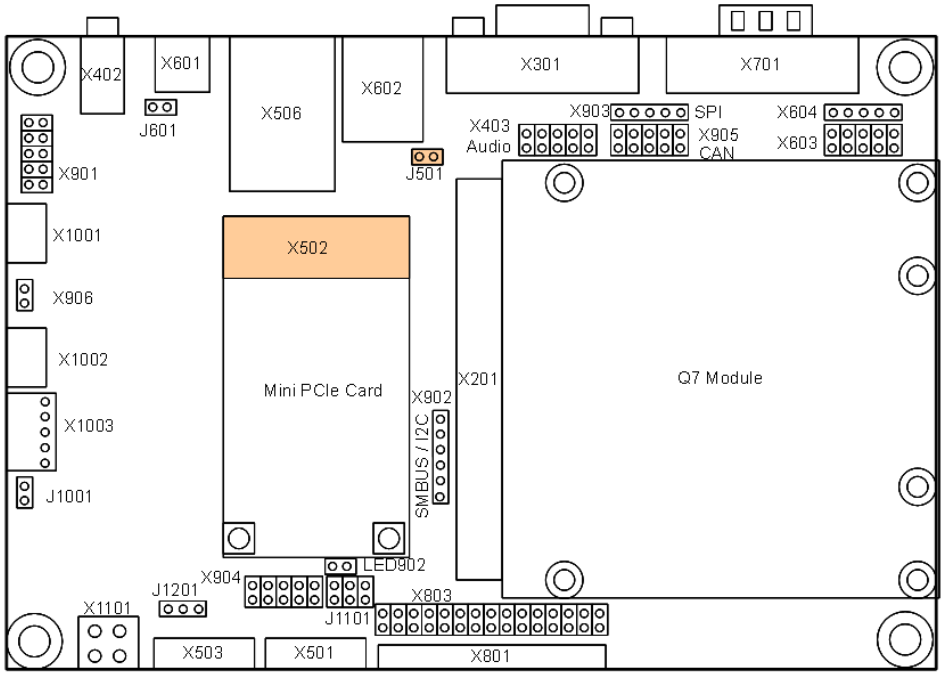
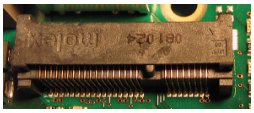
3.8 PCIe Mini Card (X502)





Specification:

- References : X502
- Pinout : Refer to Mini PCIe Mini Card Specification [9]

3.8.1 Wireless operation on mini PCIe add-in cards (J501)

A jumper is provided to enable / disable wireless operation on the mini PCIe card.

Table 20 Jumper mini PCIe Wireless Operation J501

Function	J501
wireless operation enabled	removed (default)
wireless operation disabled	installed

3.8.2 PCIe Mini Card Status LEDs

The Q7-MB-EP3 base board has 3 LEDs to display the state of an add-in mini PCIe card with wireless capabilities.

LED0501 WWAN LED

LED0502 WLAN LED

LED0503 WPAN LED

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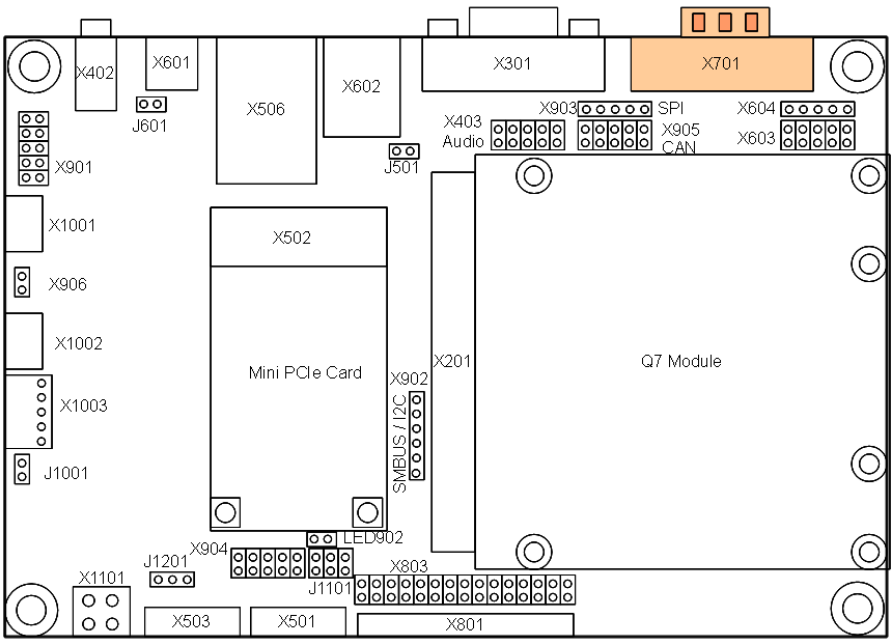
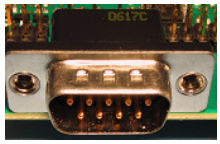
3.9 RS-232 COM port (X701)

- RS232 standard
- RS232 over LPC Super IO Chip (W83627HF).
- RS232 transceiver ESD protected +/- 15kV
- EMC improvement by using EMI filters in the signal lines





Specification:

- References : X701 (COM1) Kycon K22X-E9P-N30
- Mating : Cable RS232 D-SUB 9pin female

Table 21 Pinout COM

Pin	Signal name	Function
1	DCD#	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR#	Data Terminal Ready
5	GND	Ground
6	DSR#	Data Set Ready
7	RTS#	Request To Send
8	CTS#	Clear To Send
9	RI#	Ring Indicator

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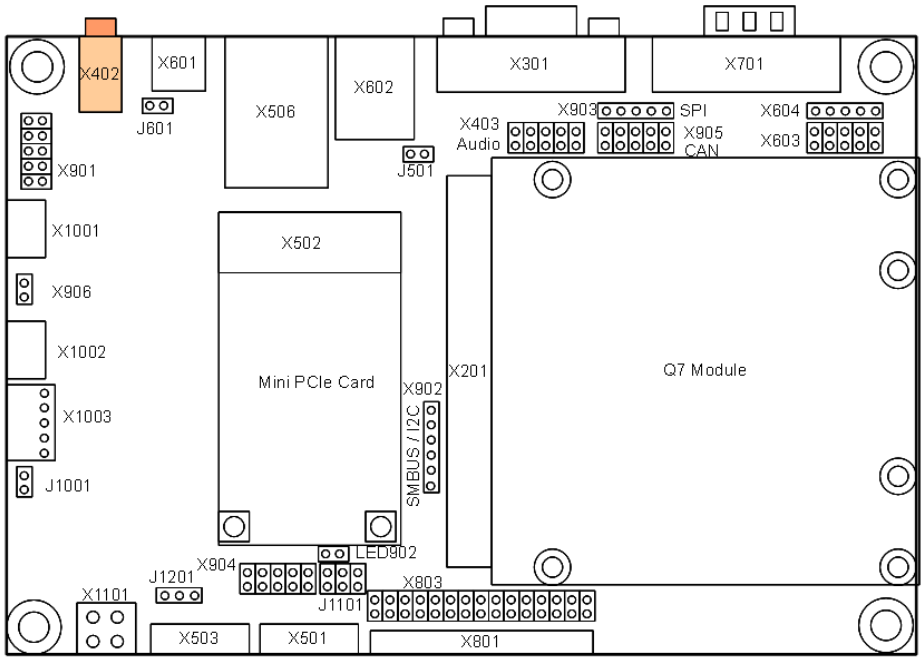
3.10 Audio interface

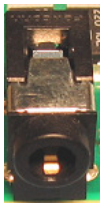
The Via VT1708A High Definition Audio codec is connected to the HDA link of the Qseven™ module.

The following LF signals are provided by the HDA codec:

- Stereo Line Out (X402)
- Pin header connector for HDA panel interface (X403)

3.10.1 Stereo Line out (X402)





Specification:

- References: X402 Foxconn JA13431-N002-4F
- Mating Cable Plug Audio 3,5mm Stereo

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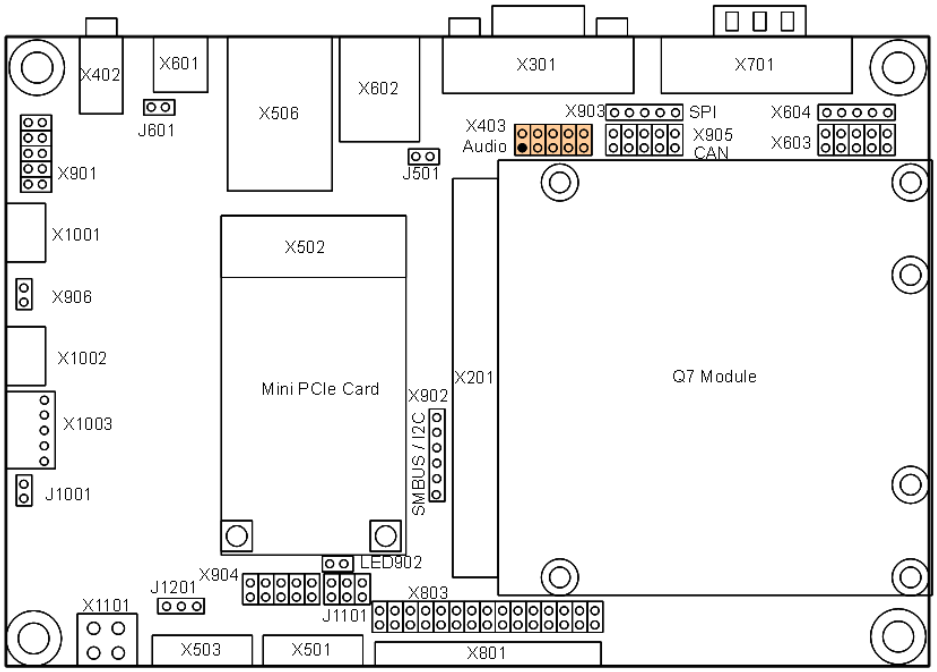
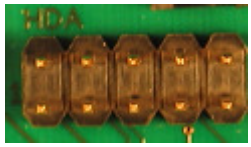
3.10.2 HD Audio (X403)





Specification:

- References: X403 CAB 1002-161-010-RoHS
- Mating female crimp-connector Reference FCI 65043-032

Table 22 Pinout HD Audio Connector X403

Pin	Signal	Pin	Signal
1	Microphone In Left	2	GND
3	Microphone In Right	4	PRESENCE# - HD presence detect
5	LINE_OUT_R	6	MIC2_JD – Jack detect
7	GND	8	NC
9	LINE_OUT_L	10	LINE2_JD – Jack 2 detect

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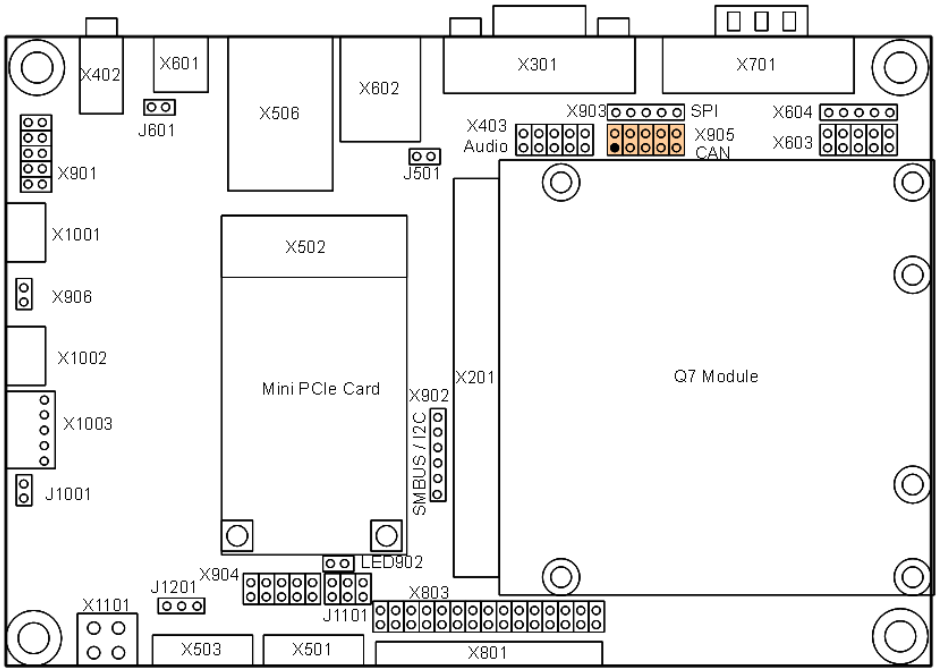
3.11 CAN Interface (X905)

The MSC Q7 MB EP3 board offers a CAN interface. The signals CAN_TX and CAN_RX from the Q7 Module are directly routed to the X903 header on the baseboard. In order to use the CAN Interface, a separate board with CAN transceiver hardware is required.



Specification:

- References: X905 CAB 1002-161-010-RoHS
- Mating female crimp-connector Reference FCI 65043-032

Table 23 Pinout CAN X905

Pin	Signal	Pin	Signal
1	+5V	2	+5V
3	NC	4	NC
5	CAN_TX	6	CAN_RX
7	GND	8	GND
9	NC	10	NC

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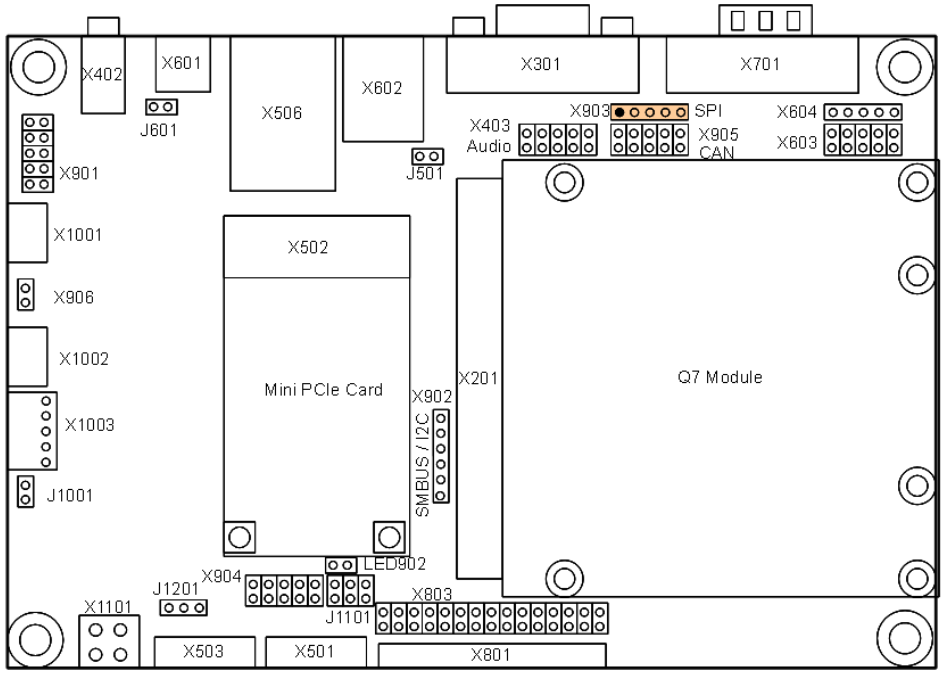
3.12 SPI Interface (X903)



Specification:

- References : X903 CAB 1001-161-005-RoHS
- Mating : female crimp-connector Reference FCI 65039-032

Table 24 Pinout SPI X903

X903 Pin	Signal
1	SPI_MISO
2	SPI_MOSI
3	SPI_CS
4	SPI_SCK
5	GND

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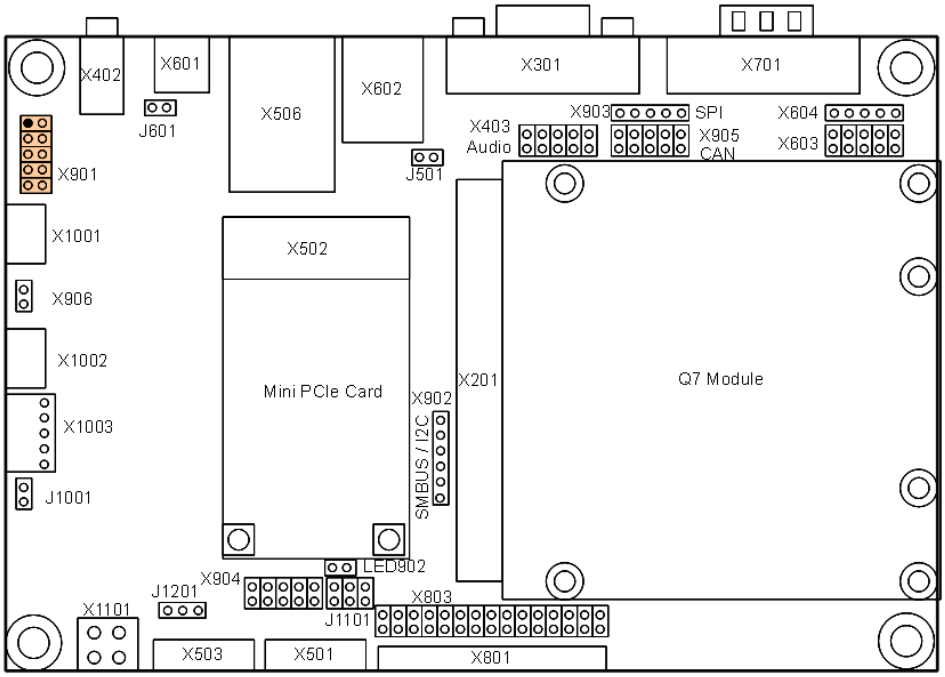
3.13 JTAG Interface (X901)



Specification:

- References : X901 CAB 1002-161-010-RoHS
- Mating : female crimp-connector Reference FCI 65043-032

Table 25 Pinout JTAG X901

Pin	Signal	Pin	Signal
1	TCK	2	+3.3V
3	TMS	4	+3.3V
5	TDO	6	JTAG_RSTBTN#
7	TDI	8	NC
9	TRST#	10	GND

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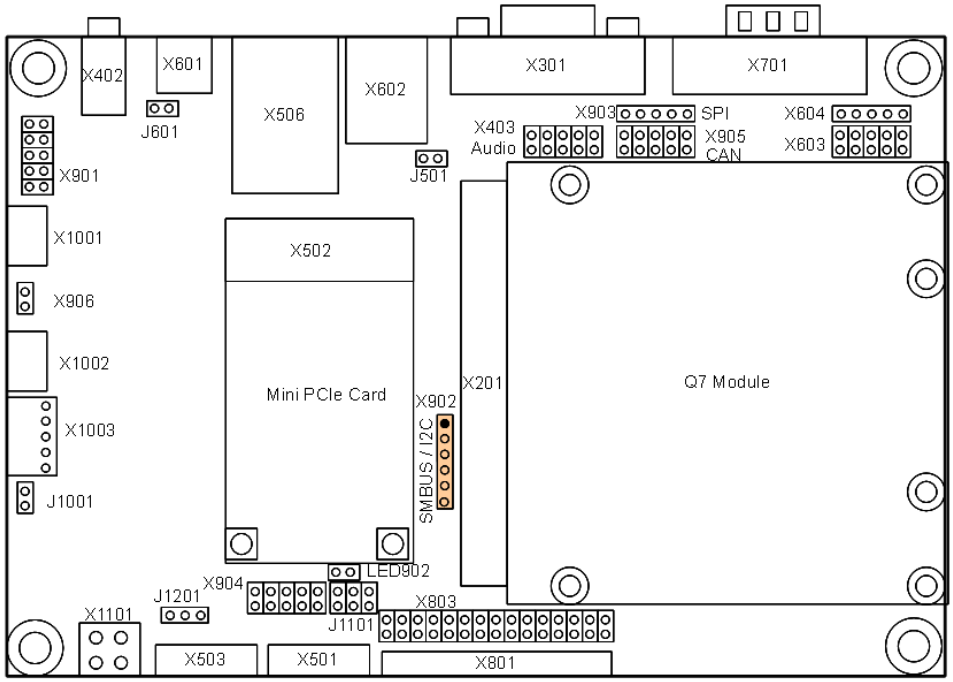
3.14 SMBUS, I2C Interface (X902)

The baseboard provides test points for the SMBUS and the I2C Bus. A 6 pin connector can also be assembled, if needed. X902 is by default not populated.



Specification:

- References: X902 CAB 1001-161-006-RoHS
- Mating female crimp-connector Reference FCI 65039-031

Table 26 Pinout SMBUS I2C X902

X902 Pin	Signal
1	I2C_DAT
2	I2C_CLK
3	SMB_ALERT#
4	SMB_DAT
5	SMB_CLK
6	GND

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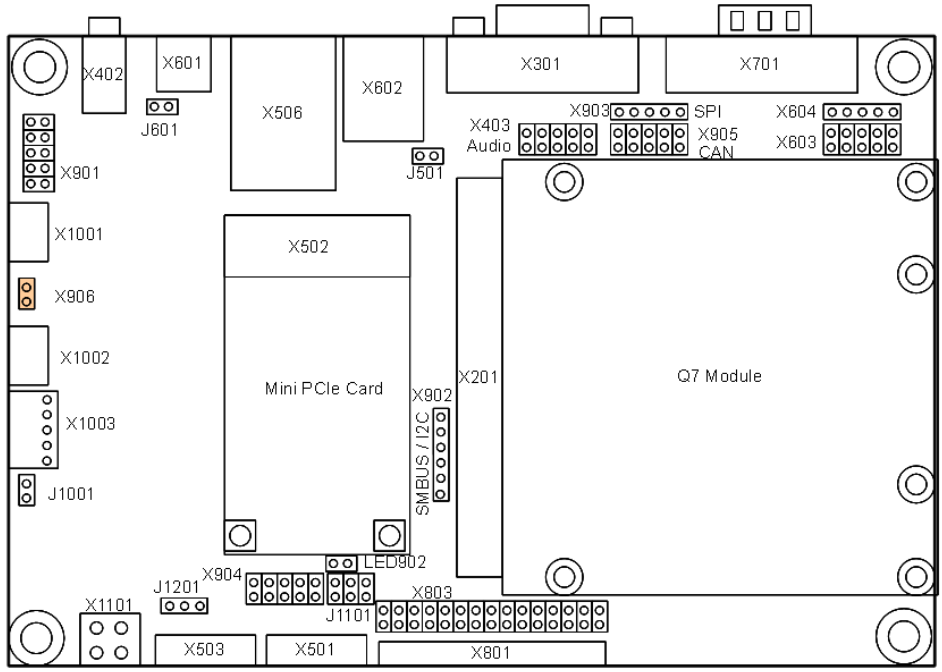
3.15 Beeper

A piezo buzzer can be wired to the X906 connector for acoustic warning signals.

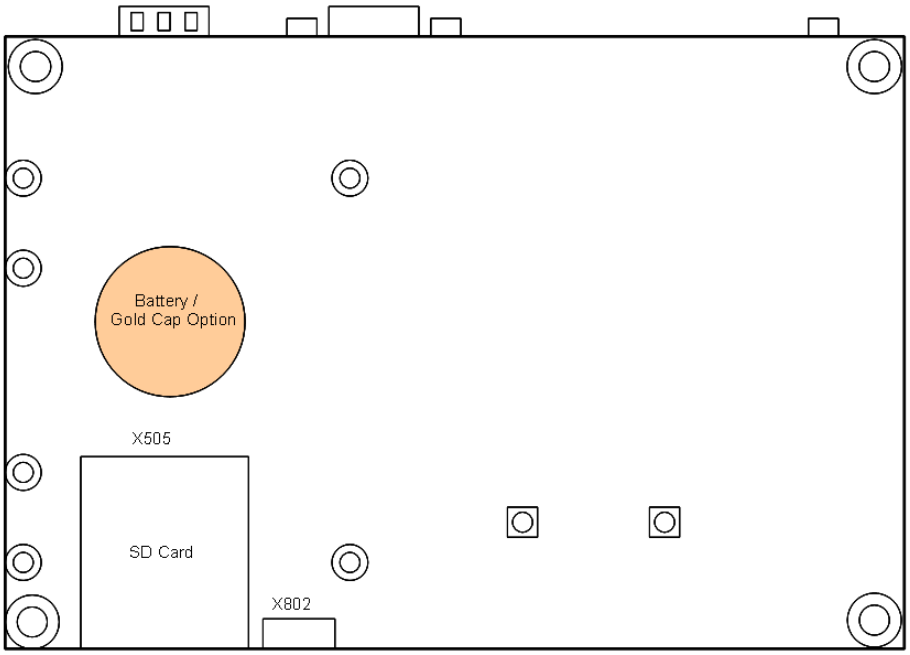
The connector X906 is not populated by default.



3.16 Battery / Goldcap

The RTC and CMOS RAM on the Qseven™ module is buffered with a battery mounted in a socket on the Qseven™ Embedded Platform. Please use Duracell DL2032 or compatible batteries.

There is also an option to fit the GOLDCAP instead of a battery. The estimated buffer time with a 1uF Goldcap ist 3 ½ days.



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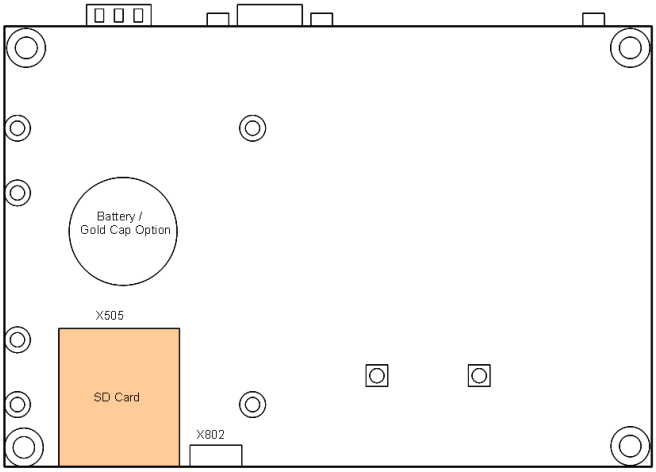
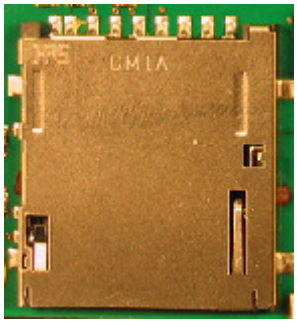
3.17 SDIO Card





Specification:

- References: X505 SD DM1AA-SF-PEJ(21) Hirose
- Mating: SD Memory Card
- Pinout: See SDIO Card specification [8]

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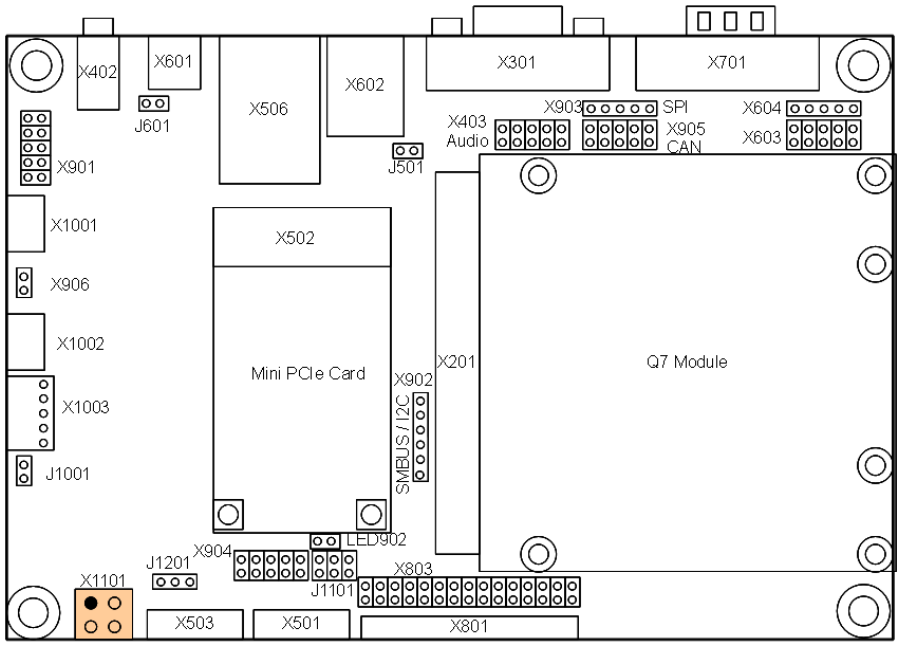
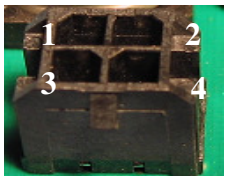
3.18 Power (X1101)

The EP3 Base Board accepts input voltages from 10V up to 28V via Power connector X1101.





Specification:

- References: X1101
- Connector: Molex 43045-0412
- Mating Molex Microfit 43025-0400, Crimp contact 43030-0007

Table 27 Pinout Power Connector X1101

Pin	Signal name	Function
1	GND	Ground
2	GND	Ground
3	VCC	10V - 28V
4	VCC	10V - 28V

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3.18.1 12V LVDS Backlight jumper (J1201)

There is a jumper option for the backlight voltage of 12V for LVDS panel. The jumper can be setup to use directly the VCCin for 12V backlight when the Input Power Source is 12V. Whereas when 15V < VCCin < 28V, the internal voltage regulator can be used to generate the 12V.

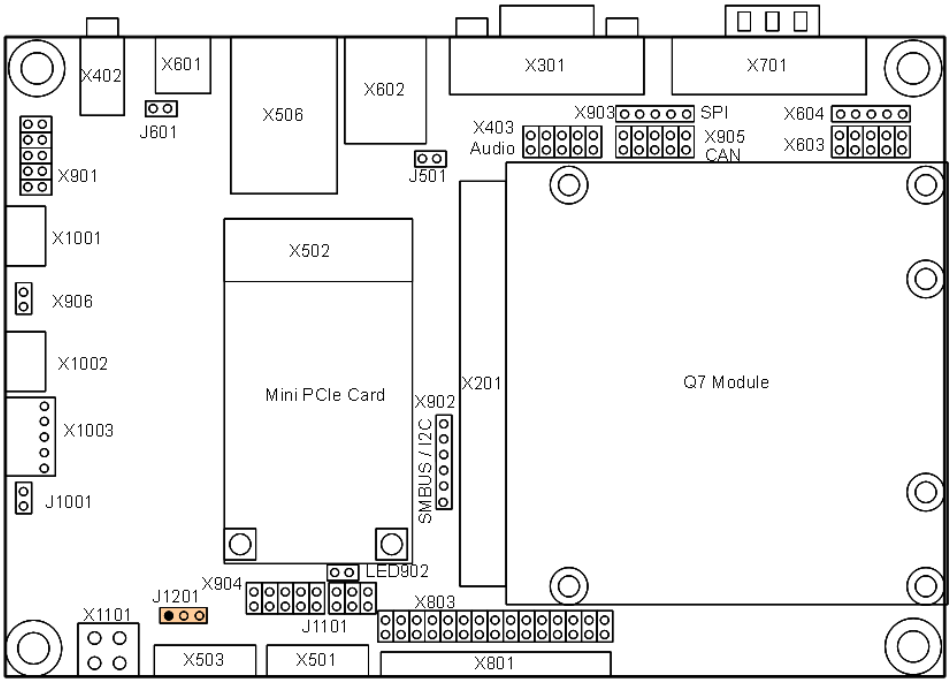
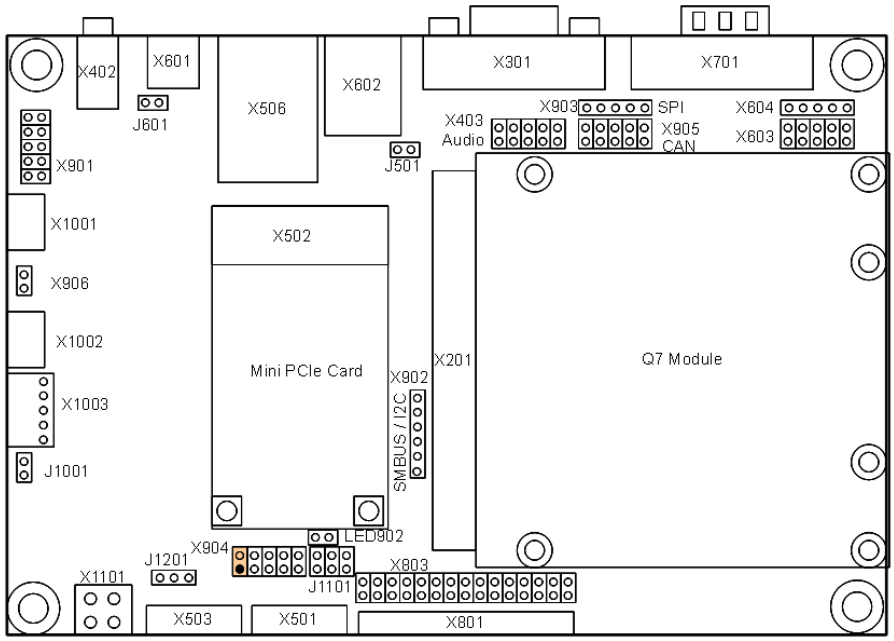


Table 28 Function J1201

Function	J1201
VCC12V connected to Input Power source	1-2
VCC12V generated from onboard Voltage regulator	2-3 installed (default)

3.18.2 RESET Button

A RESET button can be connected to the pins 1-2 of the X904 connector. The RESET# signal is low-active and is connected to the SYS_RESET# pin of the Qseven™ module.



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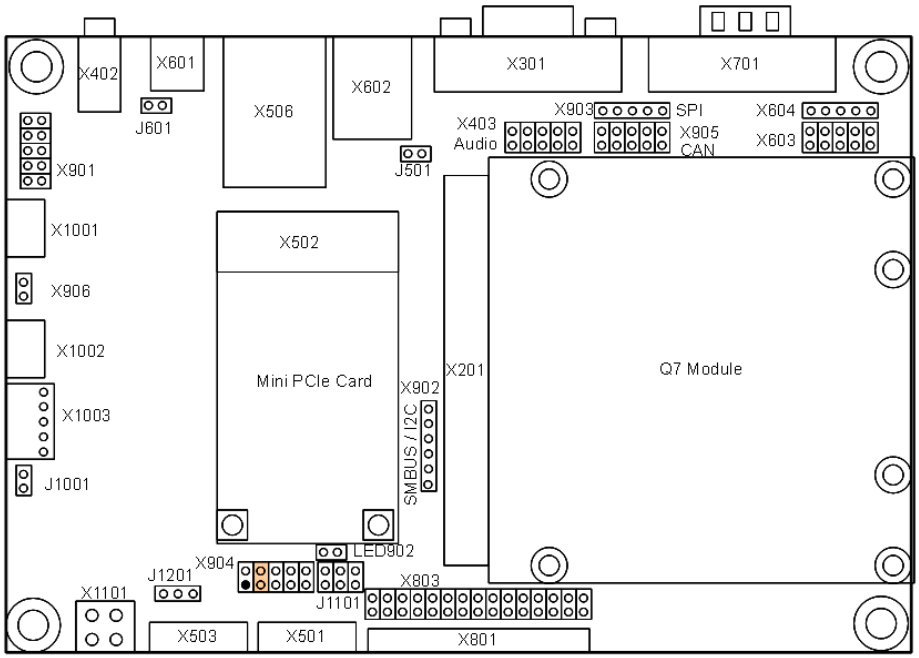
3.18.3 Sleep button

A sleep button can be connected to the pins 3-4 of X904connector.

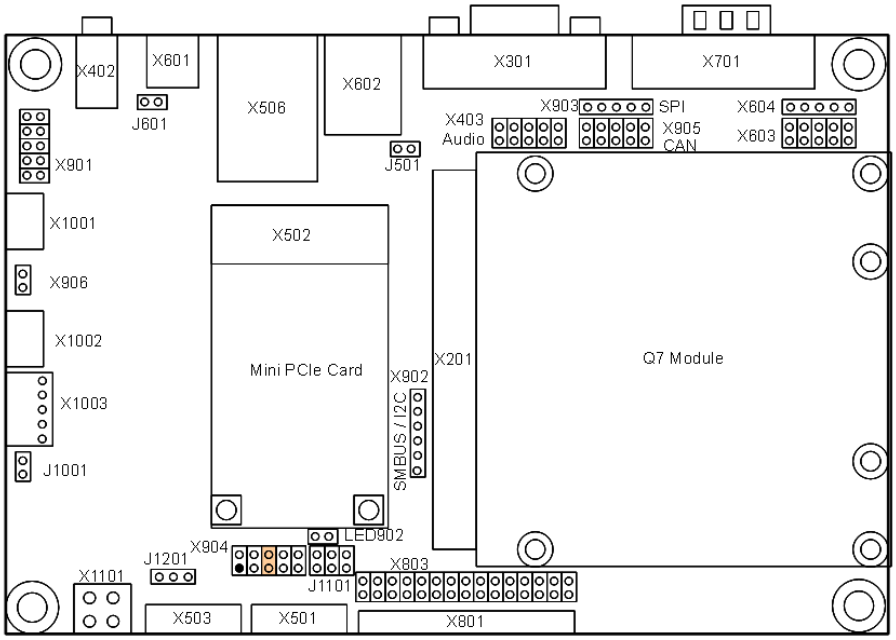
The SLP_BTN# signal is low-active and is connected directly to the corresponding pin of the Qseven™ module.



3.18.4 Power button

To control the system with a power button a switch may be connected to the pins 5-6 of X904 connector.

The PWR_BTN# signal is low-active and is connected directly to the corresponding pin of the Qseven™ module.



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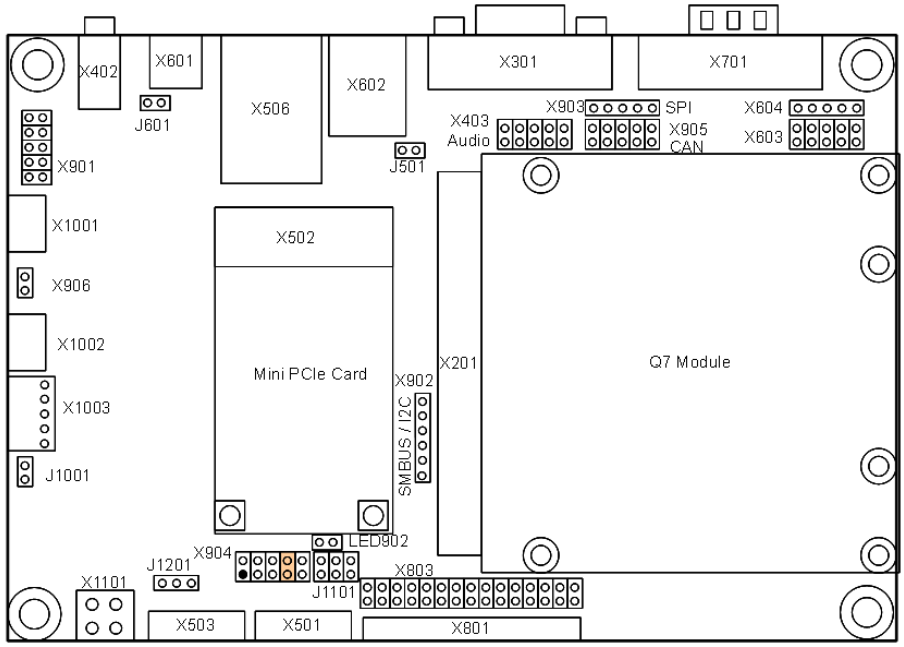
3.18.5 Lid Button

To make use of the LID signal, a switch may be connected to the pins 7-8 of the X904 connector.

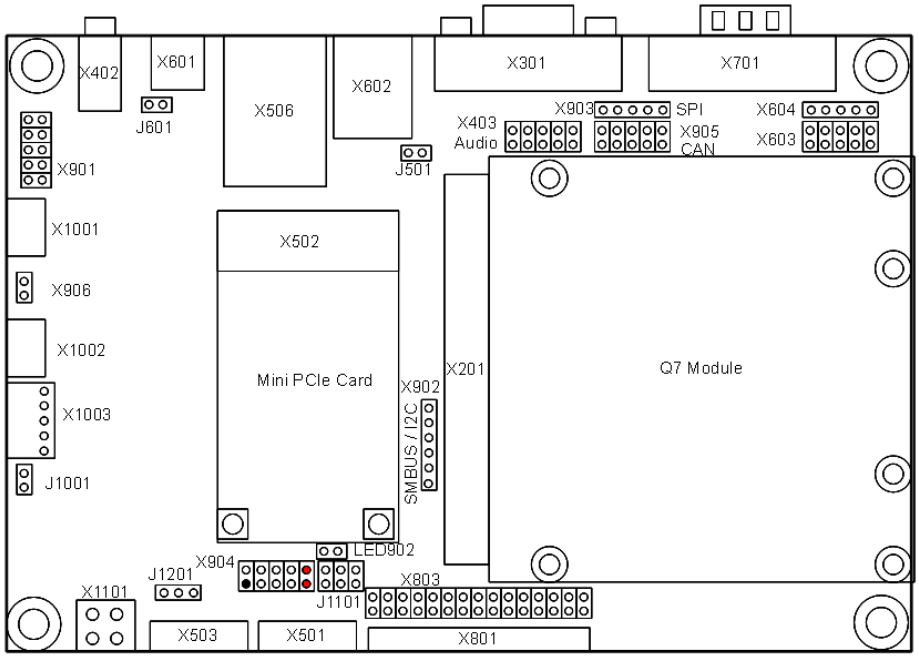
The LID_BTN# signal is low-active and is connected directly to the corresponding pin of the Qseven™ module.



3.18.6 Suspend Signal

The sus_s3# and sus_s5# signals are also available on pin7 and pin8 respectively of the X904 connector.

These signals are low-active and are connected directly to the corresponding pins of the Qseven™ module.



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3.18.7 S3 Cold/ S3 Hot feature (J1101)

The MSC Q7 MB EP3 board provides power saving feature in S3 (Suspend to RAM) mode. Two separate jumper options are provided on J1101 in order to choose either for S3-cold or S3-hot for both Baseboard and the Q7 Module. The Jumper option can be set to ensure minimum power consumed by system in S3 state.

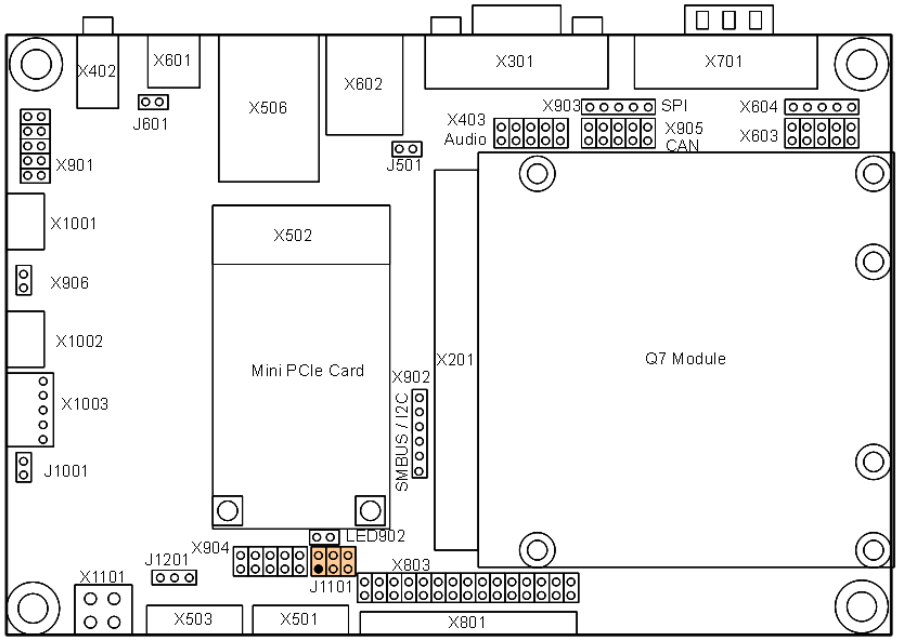

Table 29 Function J1101

J1101 pins	State	Function
1-3(Default)	S3 COLD	Board Peripherals power off
3-5	S3 HOT	Board Peripherals power remain on
2-4	S3 COLD	Module main power off, only Standby is on
4-6(Default)	S3 HOT	Module power remain on

3.19 Power LEDs

An on-board LED (LED901) indicates the presence of 5V Power on the board.

A header connector (LED902) allows the connection of an external panel mounted LED to indicate the presence of 5V power.

An on-board LED (LED904) indicates the presence of 5VStandby Power on the board.

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